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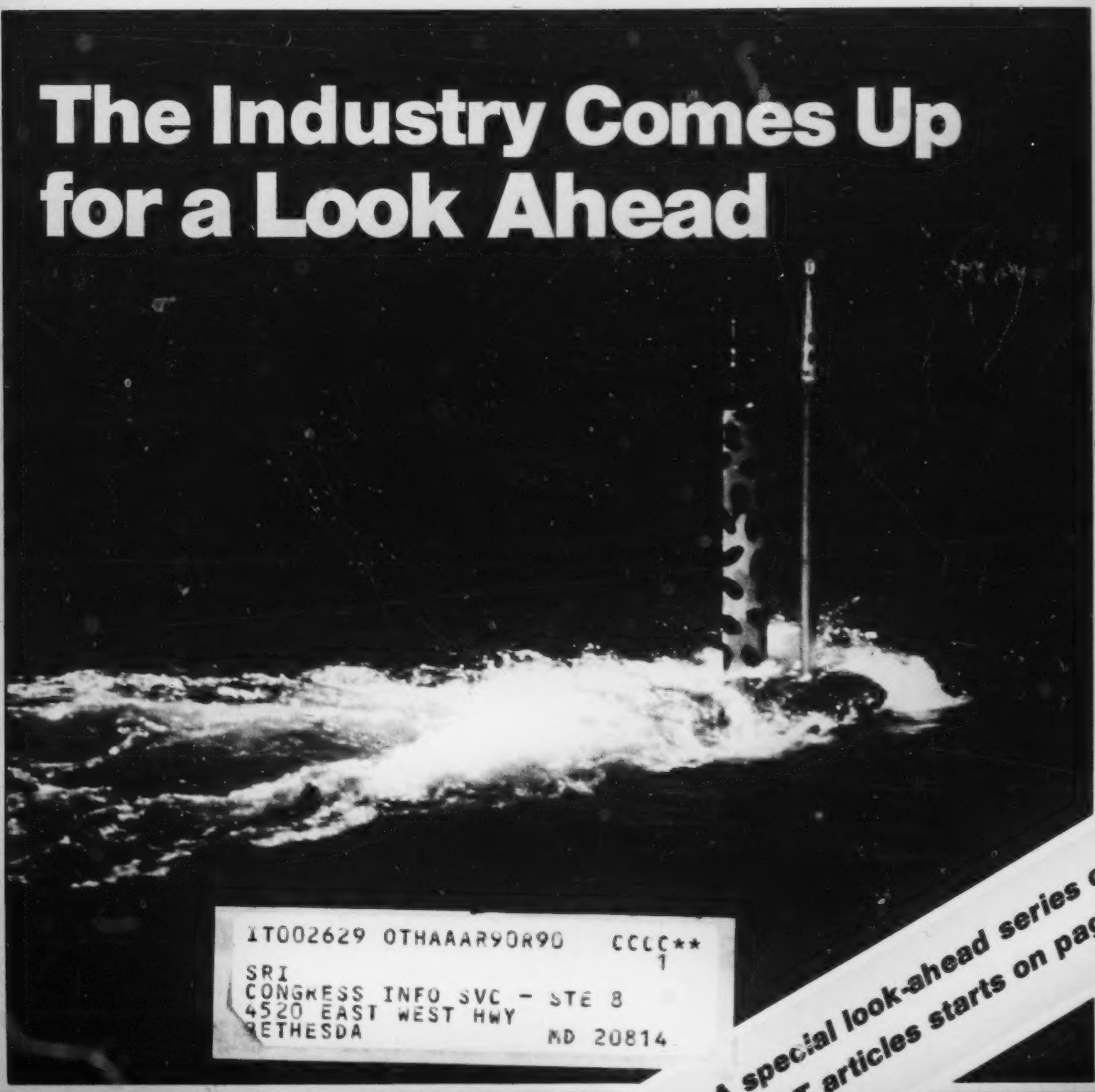
I&T
100
YEARS OF
LEADERSHIP

Implement & Tractor

The business magazine of the farm and industrial equipment industry NOV-DEC 1987

Who's Thinking About 2000 A.D.? page 19

The Industry Comes Up for a Look Ahead



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A special look-ahead series of I&T articles starts on page 4.

I&T 100 YEARS OF LEADERSHIP

Implement & Tractor

The business magazine of the farm and industrial equipment industry.

November-December 1987 • Vol. 102 • No. 13

Our Cover Story

This industry is something like a submarine that has been experiencing a depth-charge attack and is now coming up near the surface for a look ahead. The first of a series of articles and reports appears in this issue. (Official U.S. Navy photo by L.H. Jones Jr.)

10: **Distributors are making** some major changes in their operations. An *I&T* survey shows they are shifting more toward industrial and outdoor power equipment lines, but still finding plenty of action is specialized farm equipment.

13: **The development of chemical** lawn care services around the country could produce good sales for farm machinery dealers looking to expand into heavy duty/commercial mowing equipment and related products.

17: **This Minnesota dealer** is getting the data he needs to make decisions that directly affect the profitability of operations. The key is employees understanding their responsibilities and taking action on the information.

26: **How would you like to sell** 100 tractors and 200 mowers in one deal? Gene Fisher did by presenting a convincing package of information and calculating a bid that won him the sale.

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Farm Press Publications, Inc.

Distributors Are

By Bill Fogarty

TO GET a line on this business, sometimes you go to the biggest companies and ask what they're doing. Three phone calls might do it.

Other times, you survey thousands of dealers, or tens of thousands of farmers, and run tallies on hundreds of items. That's how some of the best basic data has been tracked — in the NFPEDA Cost of Doing Business annual study, for example.

And sometimes you survey a small, specialized segment of the business. If you've picked the right bunch and ask a few good questions, you learn a lot about changes in the industry, not just their own operations.

That's what *I&T* has done. We surveyed members of two organizations involved in marketing specialized farm equipment and related products around North America: the Farm Equipment Wholesalers Assn. and the Agricultural & Industrial Manufacturers Representatives Assn. Each organization has a little over 100 member companies. We received 45 replies, a solid 20 percent response.

These wholesalers and reps are involved in taking manufacturers' products and lodging them in farm, industrial, and lawn and garden equipment dealerships. Basically, wholesalers buy the goods from the manufacturer, warehouse them, and then sell and collect. Manufacturer reps don't take title to the goods, but they make sales to dealers and other basic outlets.

But it doesn't always work that way. Sometimes the wholesalers rep a product and sometimes a rep will take title to the goods. Sometimes a rep takes on a manufacturer's product line and sells it to wholesalers all over the continent. Sometimes a rep manages a warehouse set up by the manufacturer. Sometimes wholesalers and reps get deeply involved in manufacturers' marketing efforts. A few of them own or have owned manufacturing subsidiaries.

These deviations from their basic definitions as wholesalers and reps suggest several characteristics.

1. They are very flexible. They learned years ago that manufacturer-distributor relationships can endure for generations or change overnight. If they overcommit themselves to one or a few product areas, they may suffer severely when business conditions change.

2. More than anything, they are sales organizations that know their own territories. Warehouses may be

The Big Shift

Wholesalers, reps moving out of ag, into industrial, lawn and garden lines

Distributors have been working at diversifying, mostly away from agricultural lines and into industrial and lawn and garden lines, both consumer and professional. But we didn't realize the extent of the shift until we compiled these percentages.

Product Area	Percent of Sales Volume: 1984	1987	1990
Agricultural	61	52	43
Industrial	17	19	19
Outdoor power equipment			
Consumer lines	15	16	21
Professional	7	13	17

Promotion Backup

Distributors put a high value on those manufacturers who do a quality job of telling the market about their products. *I&T* asked, "Of all the suppliers you do business with, name the one who does the best job of product promotion, advertising, supplying literature, etc." Some of our 45 respondents named more than one. Here are all the ones mentioned, with frequencies in parentheses.

Brillion Iron Works (6)
Automatic Equipment (4)
Du-Al Mfg. Co. (4)
BEFCO, Inc. (3)
Great Plains Mfg. Inc. (3)
Kuhn Farm Machinery (3)
Acra-Plant Sales
Adams Hard-Facing
Bush Hog
Custom Products/Litchfield
Danuser Machine Co.
Dixon Industries, Inc.
Dethmers Mfg. Co.
Eaton Co[illegible]
Farmhand, Inc.
FIMCO, Inc.
Fuerst Bros., Inc.
Goosen Industries
Hardi, Inc.
Henke Machine, Inc.
C.C. Kelley & Son, Inc.
Kent Mfg. Co.
Kioti Tractor, Inc
Kverneland S/A
Laymoor Sweeper
Modern, Inc.
Polymark Beaver
Simplicity Mfg. Co.
Sunflower Mfg. Co.
Taylor/Pittsburgh Int'l Div.
TISCO
Tye Co.
White Outdoor Power
Woods Div., Hesston
Yetter Mfg. Co.

Making Changes

helpful, but the skills they use to find a new market opportunity or sustain an existing one are what make them successful.

3. They are vastly different from each other. They try to be. If two Southeastern distributors, for instance, are calling on basically the same dealers, they may be presenting vastly different lines of products. Not like long-line companies.

4. The business is risky, like any other. Some long-established wholesale houses have closed their doors in recent years, some by choice. Many reps have found the agricultural field in their areas overcrowded and not rewarding enough, and have gone to other product areas.

What you see here is some of the information *I&T* distilled from the responses of 45 manufacturers' reps and wholesalers.

'87 Looking Good

Despite the distributors' expectations or wishes as to where they expect to find their volumes in 1990, most of them found agricultural lines showing, at least in part, improvement in 1987. We asked them to cite products that showed "considerable 1987 sales improvement" and asked them to name both the product type and the manufacturer.

Most commonly mentioned were utility and industrial type products (19), followed by lawn and garden products (15), hay tools (11), cultivating and tillage lines (10), grain handling and storage equipment (9), feeding and processing equipment (7), fertilizing and spraying equipment (7), general mowers (6) and parts and attachments (5).

The request for manufacturer names produced a very wide variety of brands. Interestingly, very few of the 75 manufacturer names mentioned came up more than once. These were: Kuhn Farm Machinery (4), Brillion Iron Works (4), BEFCO, Inc. (3), Taylor/Pittsburgh (2), Hudson Bros. (2), Worksaver (2) and Kuker (2).

And looking not so good. We also asked the distributors to identify product areas that experienced notable declines in 1987. We didn't ask for manufacturer names this time.

About one distributor in four didn't have any bad news to report in this regard, or at least didn't share any. Among those who did, these product groups were mentioned more than once: Tillage (12), utility and industrial lines (6), spraying equipment (5), grain handling and storage lines (4), lawn and garden (4) and hay tools (3).

Right, some of the product areas that had provided volume improvements for some were down for others. Those who cited reasons for the declines mentioned the farm economy and conservation reserve programs most often, in context with tillage and grain equipment declines.

Some of the distributors who experienced gains in tillage equipment lines explained that it was because theirs was a product that cut down on traditional tillage work, or that farmers had at last worn out their tillage tools.

Aiming at '88

If you sell for a living, it helps to be optimistic. Maybe it's essential. *I&T* asked the distributors to mention which products among those they now handle were likely to have substantial sales improvement in 1988.

The product types that had been strong in 1987 and also the disappointing ones were seen as having a bright year ahead. Thus, lawn and garden and related outdoor power equipment lines were mentioned most often (17), followed by industrial and utility equipment (16) and tillage equipment (16). Interestingly, the tillage equipment types mentioned were usually conservation-oriented and less power-consuming.

Haying equipment had a strong outlook (13 mentions), followed by drills, planters and seeders (10) and spraying equipment (8). Six respondents didn't expect any 1988 improvements.

As for specific manufacturers, there was again a wide variety of names mentioned, but it was not a duplicate of the names that had been cited for 1987 sales improvements. The ones mentioned by more than one distributor, however, were much the same as the 1987 ones: Brillion (5), Kuhn (4), BEFCO, Inc. (4), Farmhand (3), Taylor/Pittsburgh (3), Worksaver (3), Polymark Beaver (3), Kelley & Sons (2), Great Plains Industries (2), Kioti Tractors (2), Du-Al (2) and Dixie Chopper (2).

As of September, distributors were generally open to taking on new product lines in 1988. Two out of three said they were looking for some specific type of product to handle; some even knew whose line they would be handling that they don't carry now.

The distributors' product areas of interest were mainly commercial mowers, consumer trailers, light industrial lines, rotary cutters, tillage items, and hay tools.

Here, some new manufacturer names came up: Rousseau mowers, Parkhurst trailers, Martl disk mowers, Kett moisture testers, Atlas mowers, Brown tree cutters, and KMC tillage. Familiar names included Worksaver disks, Koyker augers and C.C. Kelley industrial lines.

INDUSTRY UPDATE

Another Strong Month for Big Tractor Movement

September U.S. retail sales of farm equipment, according to the flash report of the Farm & Industrial Equipment Institute, featured the third straight month of increases for tractors over 100 horsepower, plus a strong improvement in combine sales. Case IH programs to dispose of old inventory in the big tractor hp brackets was said by many observers to be the prime reason for the increases. Sales of tractors under 100 hp were down.

	Unit Retail Sales					
	September			January - September		
Equipment	1987	1986	% Change	1987	1986	% Change
Farm Wheel Tractors:						
2-Wheel Drive						
Under 40 hp	4,526	4,557	(.7)	48,382	49,348	(2.0)
40 & Under 100 hp	2,294	2,577	(11.0)	22,334	23,312	(4.2)
100 & Under 140 hp	752	267	181.6	3,596	3,875	(7.2)
140 hp & Over	1,893	474	299.4	7,645	7,037	8.6
Total 2-Wheel Drive	9,465	7,875	20.2	81,957	83,572	(1.9)
4-wheel Drive						
Under 200 hp	48	25	92.0	352	382	(7.9)
200 hp & Over	99	100	(1.0)	655	941	(30.4)
Total 4-Wheel Drive	147	125	17.6	1,007	1,323	(23.9)
Total Farm Wheel Tractors	9,612	8,000	20.2	82,964	84,895	(2.3)
Combines (Self-Propelled)	1,383	950	45.6	3,871	5,146	(24.8)
Balers (Bales under 200 lbs)	389	556	(30.0)	4,706	5,033	(6.5)
Forage Harvesters (Shear Bar Type)	411	389	5.7	1,739	1,505	15.5
Mower Conditioners	853	1,126	(24.2)	9,780	9,367	4.4

These data are, in part, estimates which are subject to revisions when final detail data become available. Because of the seasonal nature of the industry, comparisons of monthly data from one period to another should be done with extreme caution. These data represent most, but not all of the manufacturers in each product category being sold at retail in the 50 states and the District of Columbia.

Case-Hesston Venture: "Hay & Forage Industries"

Hesston Corp. and Case IH have announced completion of the formation of a joint venture for the design and production of hay and forage equipment.

The joint venture, owned equally, is to be called Hay & Forage Industries.

FEMA Establishes 'No-Recourse' Financing

The Farm Equipment Manufacturers Assn. and First National Leasing, an affiliate of First National Bank, Omaha, Neb., have jointly established a non-recourse financing program for dealers in selling FEMA member companies' products.

According to FEMA, the program offers retail financing up to five years at fixed or variable rates of interest, as well as a leasing plan. Credit applications will be available to dealers from participating FEMA member firms.

Dickey-john Earns $2.26 Million for 1987

Dickey-john Corp., Auburn, Ill., has reported earnings of $2.26 million in fiscal 1987, ended June 30, on sales of $30.98 million.

INVENTORY WATCH

WHAT'S HAPPENING TO STOCKPILES IN RELATION TO SALES.

	Inventory Levels							12-Month Sales,
Equipment	Aug. 31, 1986	Mar. 31, 1987	Apr. 30, 1987	May 31, 1987	June 30, 1987	July 31, 1987	Aug. 31, 1987	Sept. 1, 1986 Aug. 31,1987
Tractors								
Under 40 hp	52,872	70,311	70,672	66,936	61,855	61,675	60,991	60,712
40-99 hp	25,417	22,949	22,706	22,032	20,834	20,644	20,464	30,151
100 hp and over	16,783	12,561	12,203	11,893	11,952	11,940	9,329	12,687
Four-wheel drive	2,372	1,592	1,494	1,479	1,480	1,469	1,415	1,692
Total Tractors	97,444	107,413	107,075	102,340	96,121	95,728	92,199	104,410
S-P Combines	6,037	4,994	5,186	5,574	6,104	5,871	5,893	5,952

Source: Farm & Industrial Equipment Institute

C3450-1

TWO DOLLARS

I&T 100 YEARS OF LEADERSHIP

Implement & Tractor

The business magazine of the farm and industrial equipment industry January 1988

Shortliners vs. Longliners pages 4, 21

Tillage/planting equipment:

FARMERS KEEP SEARCHING, CHANGING

page 10

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If You're Successful, You Never Stop Planning page 6

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January 1988 • Vol. 103 • No. 1

Our Cover Story

In interviews with tillage experts around the country, I&T learned that the practice of top farm managers is to continuously change their tillage practices to match their own changing conditions.

10

Features

6: **Realistic. Achievable.** Those are just two of the characteristics California dealer Jim Anderson says are necessary components of successful planning. And as a business grows, he says, the pressure to have a good plan is even greater.

13: **These two** South Carolina dealers take very different approaches in compensating their salesmen. One is salary-oriented; the other is commission-oriented.

21: **It's clear** that shortline manufacturers and their dealers are thinking hard about dealerships and their own access to them. *I&T* reports on several roundtable discussions of this situation.

24: **Despite solid** sales increases for 1987 and optimism for 1988, people in the shortline equipment industry expect that segment's comeback trail to be a long one.

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Tractor Sales Pulled About Even in October

Retail sales of farm tractors in the first 10 months of 1987 were just about level with those of 1986 after several strong sales months, according to Farm & Industrial Equipment Institute's October flash report. Unit volume for the year was off by only 1.7 percent after large sales surges in the over-100-hp brackets in the third quarter. October tractor volume was up in most categories.

Unit Retail Sales

	October			January-October		
Equipment	1987	1986	% Change	1987	1986	% Change
Farm Wheel Tractors:						
2-Wheel Drive						
Under 40 hp	5,072	5,300	(4.3)	53,455	54,648	(2.2)
40 & Under 100 hp	3,379	3,168	6.7	25,712	26,480	(2.9)
100 & Under 140 hp	613	571	7.4	4,208	4,446	(5.4)
140 hp & Over	1,325	1,081	22.6	8,969	8,118	10.5
Total 2-Wheel Drive	**10,389**	**10,120**	**2.7**	**92,344**	**93,692**	**(1.4)**
4-Wheel Drive						
Under 200 hp	105	69	52.2	456	451	1.1
200 hp & Over	164	179	(8.4)	819	1,120	(26.9)
Total 4-Wheel Drive	**269**	**248**	**8.5**	**1,275**	**1,571**	**(18.8)**
Total Farm Wheel Tractors	**10,658**	**10,368**	**2.8**	**93,619**	**95,263**	**(1.7)**
Combines (Self-Propelled)	1,545	1,423	8.6	5,416	6,569	(17.6)
Balers (Bales under 200 lbs)	289	312	(7.4)	5,001	5,345	(6.4)
Forage Harvesters (Shear Bar Type)	301	386	(22.0)	2,042	1,891	8.0
Mower Conditioners	649	688	(5.7)	10,430	10,055	3.7

Deere Offers Patents On Safety Device

Deere & Co. has announced that it has made available at no cost to the farm equipment industry its patents on a transmission device that reduces accident risks.

The transmission valve, developed at Deere's Product Engineering Center at Waterloo, Iowa, prevents hydraulically activated transmission clutches from engaging unless the clutch pedal has been depressed and released by the operator following each start.

Injuries have happened when operators started their tractors by bypassing normal circuitry while standing on the ground. If the transmission is in gear, the tractor will start, endangering the person on the ground. The device in the clutch hydraulic circuit won't allow the machine to move following a start.

Ritchie Industries Acquires Best Way

Ritchie Industries, Inc., Conrad, Iowa, a manufacturer of livestock watering equipment, has acquired Best Way, Inc., Clear Lake, Iowa, according to Cliff Wilson, Ritchie president.

Canadians Expect Improvement in Sales

Retail sales of farm equipment in Canada are expected to improve in 1988 after a tough 1987, according to the Canadian Farm & Industrial Equipment Institute.

In November, participating manufacturers estimated that farm tractor sales for 1987 would finish out at 17,393 units, down 11 percent from the 1986 level of 19,635 units. They expect a modest increase in 1988 to 17,805 units sold.

In 1987, the front-wheel-assist feature was sold on 58 percent of the 16,509 two-wheel-drive tractors sold. The percentage is expected to hold in 1988 with sales of 16,892 two-wheeler units.

Self-propelled combine sales fell sharply in 1987 to 1,531 units from the 2,820 sold in 1986. A slight recovery is expected in 1988: 1,580 units.

Pull-type combine sales were also down severely in 1987 at 533 units compared with 1986's 1,017. They predict sales of 542 units for 1988.

Self-propelled swathers: 1,521 sold in 1986; 917 in 1987; projected for 1988—930 units.

Pull-type swathers: 1,519 sold in 1986, 1,367 in 1987. Projected for 1988—1,383.

Big balers: 3,163 sold in 1986; 3,320 sold in 1987. Expected sales in 1988—3,270 units.

Conventional balers: 1,680 sold in 1986, 1,570 in 1987. Projected for 1988—1,589.

Forage harvesters (shear type): 528 sold in 1986, 512 in 1987. For 1988—513.

Mower-conditioners: 2,568 sold in 1986, 2,580 in 1987. Predicted for 1988—2,557.

Moldboard plows: 422 sold in 1986, 525 in 1987. For 1988—511 sales predicted.

Chisel plows: 841 sold in 1986, 983 in 1987. Expected in 1988—1,000.

Grain drills—3,049 sold in 1986, 2,600 in 1987. For 1988—2,601.

Corn planters: 472 in 1986, 320 in 1987. For 1988—348.

Disk harrows: 687 sold in 1986, 645 in 1987. The 1988 outlook—576 units sold.

Manure spreaders: 1,865 units in 1986, 1,708 in 1987. For 1988: 1,712.

Grinder-mixers: In 1986, 279 sold; in 1987, 225. For 1988—225 units.

The information was presented at CFIEI's annual meeting Nov. 19 in Toronto by Lawrence Ruud, John Deere Ltd., and Jerry McLeod, J I Case Canada. Cited as positive indicators for the future farm equipment market were:

Farm income, expected to be up 14 percent from the 1986 level because of a strong livestock sector and government support.

Debt reduction by farmers. Debt peaked in 1985 at $22.1 billion (Canadian) and at the end of 1987 is believed to be down to just over $21 billion.

Livestock sector. Inventories are stabilizing and heifer retention is up, holding slaughter prices strong. Feed costs are lower.

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FIEI Forecasts/1988, 1989 **page 19**

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Brake Lines
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Page 13:

Opening the First John Deere Parts Store

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I&T 100 YEARS OF LEADERSHIP

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On Our Cover

Manager Steve Ellison talks with visitors at the first John Deere Parts Store, opened in November at Hollis, Okla., by Yates Implement Co., Altus, Okla. That's right, those are automotive parts in the foreground.

13

Features

9: **There's a major push** in the industry to find out more about the basics of chemical use in agriculture. This report looks at research and other developments.

19: **Optimism about business** in 1988 and 1989 colors the outlook of many manufacturers of field and farmstead equipment. Here's a report on FIEI's group forecast.

22: **Here's a man** who deals strictly in used John Deere tractors. Good reconditioning practices and service followup have kept him operating since 1959.

25: **What are OEM parts executives** smiling about? An FIEI survey of 35 manufacturers of agricultural and industrial equipment indicates improved sales are behind those smiles.

27: **It's been tough** in Europe, too. The market has slowed, mergers have increased, and the dollar is weaker.

29: **Pro Show 87,** an industry-wide show for commercial landscape and turf and grounds maintenance professionals, reported modest attendance, but the market outlook remains bright.

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1987 Retail Sales Results: Mix of Improvements, Declines

The December flash report of the Farm & Industrial Equipment Institute showed strong year-end finishes for some products (tractors over 40 hp, combines, forage harvesters) and pronounced dips for others (under-40-hp tractors from Japan, small balers). For the 12 months, the biggest gainers were forage harvesters and two-wheel-drive tractors over 140 hp.

An article in this issue reporting the forecast of FIEI's Marketing & Management Conference was prepared before the arrival of the December flash report as *I&T* was going to press. Thus, some conflict is noted between these 1987 numbers and those shown in the article, which were estimates in part.

Unit Retail Sales

Equipment	December 1987	 1986	 % Change	January-December 1987	 1986	 % Change
Farm Wheel Tractors:						
2-Wheel Drive						
Under 40 HP	3,241	3,914	(17.2)	59,858	61,648	(2.9)
40 & Under 100 hp	3,097	2,480	24.9	30,761	30,848	(.3)
100 & Under 140 hp	511	348	46.8	5,090	5,149	(1.1)
140 hp & Over	960	425	125.9	10,827	9,113	18.8
Total 2-Wheel Drive	7,809	7,167	9.0	106,536	106,758	(.2)
4-Wheel Drive						
Under 200 hp	111	96	15.6	602	595	1.2
200 hp & Over	146	152	(3.9)	1,051	1,442	(27.1)
Total 4-Wheel Drive	**257**	**248**	**3.6**	**1,653**	**2,037**	**(18.9)**
Total Farm Wheel Tractors	**8,066**	**7,415**	**8.8**	**108,189**	**108,795**	**(.6)**
Combines (Self-Propelled)	806	496	62.5	7,184	7,660	(6.2)
Balers (Bales under 200 lbs)	165	217	(24.0)	5,330	5,734	(7.0)
Forage Harvesters (Shear Bar Type)	212	126	68.3	2,392	2,164	10.5
Mower Conditioners	434	428	1.4	11,244	10,898	3.2

Deere's '87: Sales Up, Losses Down

Deere & Co. had sales of $4.1 billion in fiscal 1987, ended Oct. 31, up 18 percent from the $3.5 billion of 1986. Production was up 12 percent. For the fourth period, sales were $1.3 billion, up 61 percent from the strike-affected level of 1986, $818 million.

For 1987, Deere had a net loss of $99 million, compared with $229 million in 1986. In the fourth quarter, net income was $32 million, compared with a net loss of $140 million in 1986's fourth period.

Deere said that fourth quarter income was affected by $40 million in benefits mainly from tax losses carried forward.

Net income of Deere's retail finance and leasing subsidiaries declined to $52 million from $54 million. Insurance net income was $38 million, up from the $37 million of 1986.

Worldwide farm equipment sales were up 22 percent to $3.2 billion, compared with $2.6 billion in 1986. Industrial equipment volume was $911 million, up 5 percent.

Dealer receivables were $2.11 billion as of Oct. 31, 1987. A year earlier, they were $2.08 billion. North American farm equipment receivables were lowered by $355 million in 1987, Deere said, but industrial, consumer product and overseas receivables were increased.

Canada Winds Up a Tough Year

Sales were down in most product categories in 1987, according to the December flash report of the Canadian Farm & Industrial Equipment Institute. The only gainers were tractors under 40 hp — 4,708 units, up 9.3 percent — and large balers — 3,310, up 4.6 percent.

Sales of four-wheel-drive tractors fell 39 percent to 984 units. Tractors from 40-99 hp were down 3.6 percent at 9,043; tractors 100 hp and over were off 11.4 percent at 3,058. Total tractor volume of 17,793 units was off 5 percent.

Major Canadian declines for 1987: self-propelled combines, off 46 percent at 1,517; pull-type combines, off 66 percent at 350 units, self-propelled swathers, off 50 percent at 767 units.

Product Liability Seminar by FEMA

The Farm Equipment Manufacturers Assn. will hold a two-day seminar on product liability March 3-4 at the Hyatt Regency O'Hare Hotel, Chicago, addressed to member firms' senior management, design engineers and corporate or retained legal counsel.

The seminar will be chaired by Kenneth Ross, attorney specializing in advising manufacturers on minimizing risk of product liability and contractual liability, and maximizing safety.

Other participants will include Keith L. Pfundstein, KPS Technology, a product safety consulting firm, and Russell Hahn, American Society of Agricultural Engineers. Pfundstein is Deere & Co.'s retired manager of product safety.

FEMA is based at 243 N. Lindbergh Blvd., St. Louis, Mo. 63141, telephone 314/991-0702.

Varity 9-Month Sales Hit $1.38 Billion

Varity Corp. has reported that sales for the first nine months of the 1987 fiscal year, ended Oct. 31, were $1.38 billion after third quarter sales of $465 million were posted. In 1986, volume was $966 million for the nine months and $256 million for the quarter.

For the nine months, the company had a loss figure of $11.9 million after posting a profit of $5.7 million in the third quarter. In 1986, losses were $4.7 million for the nine months and a loss of $19.7 million in the third period.

Part of the sales increase was due to the acquisition of Dayton Walther Corp., maker of automotive components.

Farm equipment sales volume was $786 million for the nine months and $257 million for the quarter, both up from the $682 million and $165 million levels of 1986. Engine sales volume was $331 million for the year and $117 million for the third period, compared with $266 million and $84 million a year earlier.

Marketers Like Outlook for '88, '89

By Bill Fogarty

MANUFACTURERS of both field and farmstead equipment are looking on 1988 and 1989 with something you might call optimism. The industry's group forecast, conducted by the Farm & Industrial Equipment Institute, is for an increase of 5 percent in U.S. retail dollar volume.

By way of comparison, last year the manufacturers of field equipment predicted that 1987 would generate a median increase of 2.8 percent; the farmstead equipment marketers were looking for a flat 1987, about even with 1986.

One new feature of the forecast for 1988: The FIEI asked both the field equipment (Farm Equipment Division) and farmstead (Agri-Equipment Division) marketers to estimate what the 1988 total industry dollar volume would be on wholesale service parts compared to 1987. Both groups brought in a median verdict of up 5 percent.

How did the forecast at the start of 1987 compare with what actually happened? There are no public retail sales reports on farmstead equipment groups, but most of the field equipment is reported in numbers, so it's possible to compare predictions and results.

Tractors: The marketers were looking for a lift in tractor sales in most horsepower categories last year, but only in the sharply discounted range of over-100-hp did they get it. Sales of under-40-hp units were off slightly at 60,333 rather than up to 62,713, as predicted. Total units sold in 1987 came to 106,433; total predicted, 110,568.

Combines: Sales of self-propelled combines in 1987 were 6,700, a little over the cautious forecast of 6,411 units.

Balers: Square baler sales of 5,400 fell under the predicted 5,750 for 1987, but big-baler sales came in at around 10,000, better than the expected 9,350 units.

(More, next page)

U.S. Retail Sales Forecast, 1988-1989 (In units)

Product	(Actual + Est. Dec. Sales) 1987	Sales Forecast for 1988	1989
Tractors			
Under 40 hp	60,333	60,000	60,000
40-99 hp	30,000	31,210	32,750
100 hp and over	14,500	14,500	15,300
4-wheel drive	1,600	1,500	1,900
Total Farm Tractors	106,433	107,210	109,950
S-P combines	6,700	6,890	7,200
Corn heads	3,800	4,100	4,250
Forage harveters[1]	2,300	2,400	2,450
Balers, square[2]	5,400	5,500	5,550
Balers, round[3]	10,000[E]	10,350	10,350
Windrowers	1,600	1,500	1,600
Mower-conditioners	11,193	11,488	11,483
Grinder-mixers	2,175	2,050	2,000

E: Estimated by *I&T* (1) Shear-bar type. (2) Bales under 200 lbs. (3) Bales over 200 lbs.

Source: Farm & Industrial Equipment Institute

Other Product Retail Sales Forecasts, 1988-1989

Product	Percent of Change 1988 from 1987	1989 from 1988
Augers, elevators	0	-2.5
Crop dryers, in-bin	-12.5	0
Crop dryers, batch and continuous flow	+2.5	0
Dairy and beef equipment	+5	+2.5
Hog equipment	+4.3	0
Grain bins	-22.5	0
Milking Machines	-1.5	0
Manure spreaders	+4.6	+3
Disk harrows	+5	+3
Field cultivators	+5	+3
Chisel plows	+6.2	+4.1

Source: Farm & Industrial Equipment Institute

Forecast *(from page 19)*

Mower-Conditioners: The 1987 forecast was for 11,325 units; actual sales were 11,193, close.

Of the 28 marketers of field equipment, only six predicted no change and one saw a decline. The other 23 expected improvements of 2.5 to 10 percent. Their reasons for optimism tended to focus on better farm income, government programs and the current age of equipment on farms.

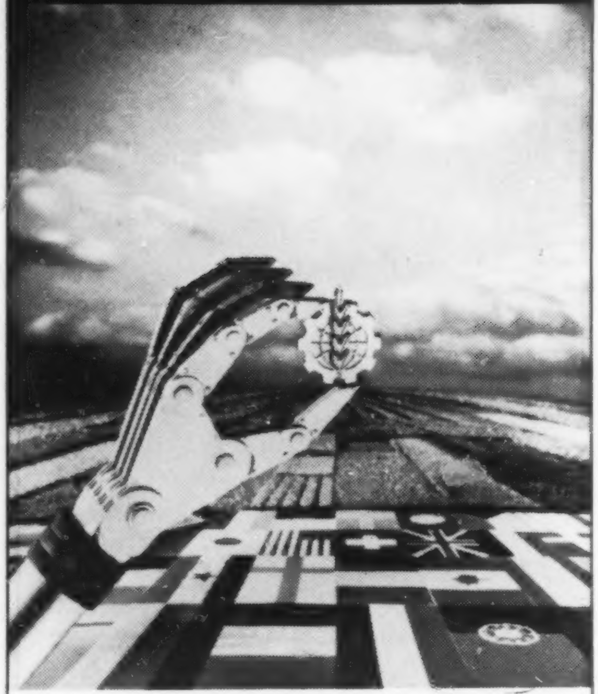
Among 24 participants in the farmstead equipment forecasting, 13 saw improvement, four no change and seven a decline.

Some of the brightest outlooks are reserved for 1989. For example, the six marketers of combines see sales in 1989 coming in at a median 7,200 units. The actual range of estimates among the six is for sales of from 7,000 to 10,000. Round balers are expected to top 10,000 units in both 1988 and 1989.

Despite citing the current age of equipment presently at work on farms as a reason for more unit sales in 1988, the forecasters, in their individual comments, offer the needs of older units in the field as a reason for an increased parts sales forecast. Other reasons cited include better pricing practices, better farm economy, better sales efforts in the parts aftermarket, and taking business away from "parts houses." More than one cited inflation as a reason.

The forecast was made public at the FIEI's Winter Marketing & Management Conference Feb. 4-6 at Tucson, Ariz. ☐

PROGRESS ON THE MARCH AGAIN



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Issue Ad Closing	Editorial Emphasis
March issue (February 10, 1988)	•Lawn/Garden/Outdoor Power Equipment
Red Book (February 28, 1988)	•Farm and Industrial Equipment Specifications Encyclopedia
April issue (March 10, 1988)	•Service/Shop Management, Part 1
May issue (April 10, 1988)	•Forage/Hay/Grain Handling Equipment
June issue (May 10, 1988)	•Wood Handling Equipment •International Lawn, Garden, & Power Equipment Expo (Louisville) Preview
July issue (June 10, 1988)	•Harvesting Equipment
August issue (July 10, 1988)	•All Terrain Vehicles
September issue (August 10, 1988)	•Service/Shop Management, Part 2
October issue (September 10, 1988)	•I&T's Annual Statistics Issue
Product File (September 30, 1988)	•Master product directory, mailing addresses, brand names, other information useful to industry professionals
November/December issue (October 10, 1988)	•Review/Outlook Issue
January issue (December 10, 1988)	•Planting/Tillage Equipment
February issue (January 10, 1989)	•Spraying/Application Equipment

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YEARS OF
LEADERSHIP

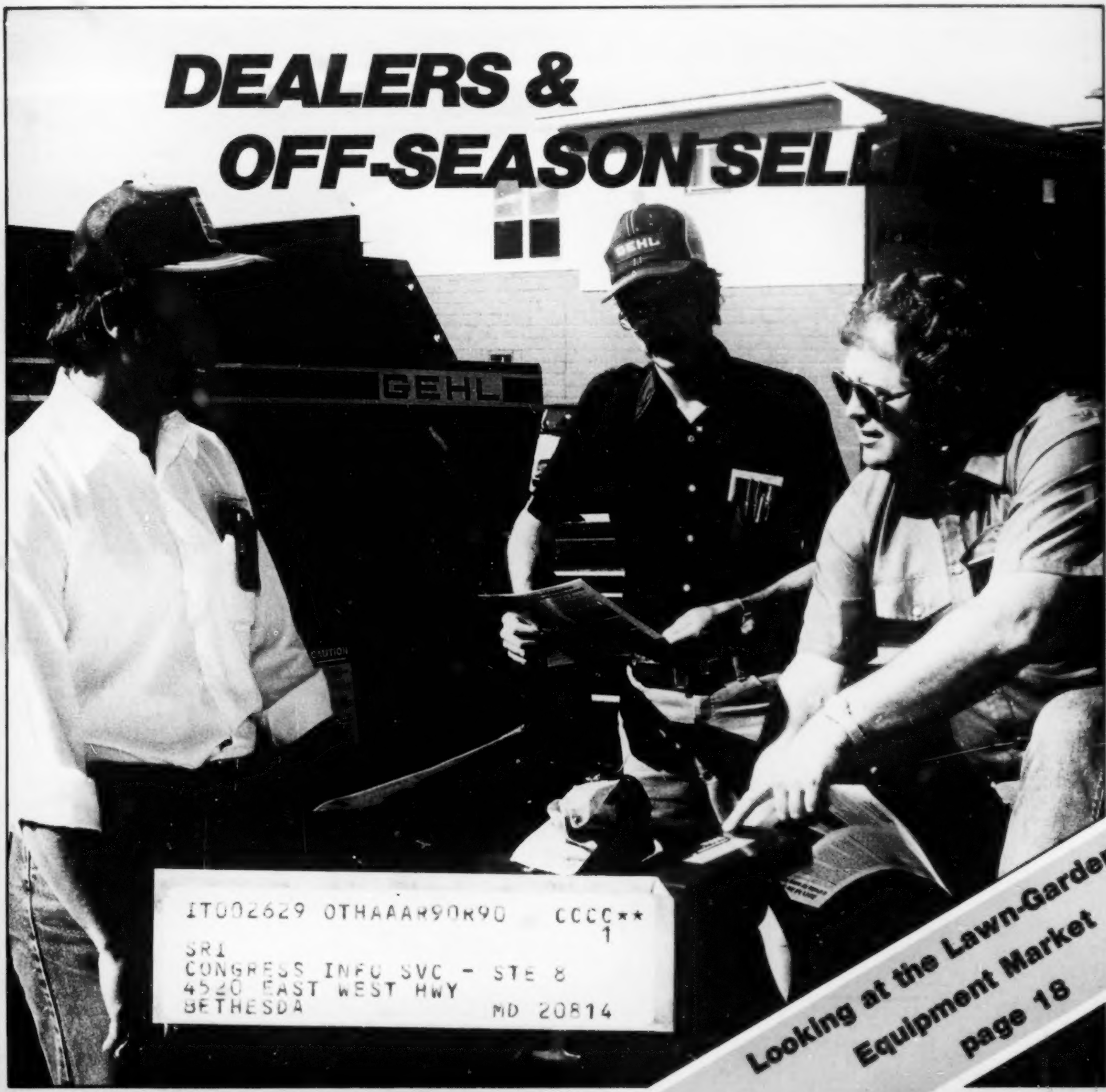
Implement & Tractor

The business magazine of the farm and industrial equipment industry

March 1988

Shortliners: Where Will They Go? page 10

DEALERS & OFF-SEASON SEL



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I&T 100 YEARS OF LEADERSHIP

Implement & Tractor

The business magazine of the farm and industrial equipment industry.

March 1988 • Vol. 103 • No. 3

On Our Cover

Dale Schraufnagel (left), Rick Welak and Larry Schraufnagel of Lomira, Wis., reflect on changes in farmers' buying patterns. Their summertime spreader sales, for instance, are up.

25

Features

10: **Will shortliners** be able to keep their current places in majors' dealerships? What other possibilities are there? Several shortline manufacturers give their views in this feature.

11: **Farmhand's Joe Lund** speculates on the general approach to marketing he sees for the farm equipment industry.

14: **Here's one dealer** who is surviving the era of the big discount—using a combination of good used equipment, selected shortlines and strong merchandising plans.

18: **Finding the right people** and helping them do their job well are keys for this dealer's growth in the outdoor power equipment market.

22: **Do you know** what a buyer wants to know when he's shopping for a lawn mower? Here are the six most frequently asked questions.

28: **The outdoor power equipment** market continues its steady pattern of growth. Here's a look at what's been happening.

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INDUSTRY UPDATE

January Retail Sales Jumped

U.S. retail sales of farm tractors and combines in January kept up the pace that was going on at the end of 1987, according to the flash report of the Farm & Industrial Equipment Institute.

Two-wheel-drive tractors: Under 40 hp—2,949 units, just two sales under the January 1987 level. From 40-99 hp—2,394 units, up 16 percent. From 100-139 hp—512 units, up 45 percent. 140 hp and over—1,255 units, up 94 percent. Total—7,110 units in January 1988, up 18 percent from the 6,021 in January 1987.

Four-wheel-drive tractors: Under 200 hp—66 units, up 113 percent. 200 hp and over—114 units, up 27 percent. Total—180 units, up 49 percent.

Total tractors: 7,290 units in January 1988, up 19 percent from the 6,142 units of January 1987.

Combines: 606 self-propelled units sold, up 265 percent from the 166 of January 1987.

Balers, under 200 lbs.—down 18 percent at 191 units.

Forage harvesters, shear-bar type—down 25 percent at 64 units.

Equipment	Unit Retail Sales January 1988	 1987	 % Change
Farm Wheel Tractors:			
2-Wheel Drive			
Under 40 HP	2,949	2,952	(.1)
40 & Under 100 HP	2,394	2,068	15.8
100 & Under 140 HP	512	353	45.0
140 HP & Over	1,255	648	93.7
Total 2-Wheel Drive	7,110	6,021	18.1
4-Wheel Drive			
Under 200 HP	66	31	112.9
200 HP & Over	114	90	26.7
Total 4-Wheel Drive	180	121	48.8
Total Farm Wheel Tractors	7,290	6,142	18.7
Combines (Self-Propelled)	606	166	265.1
Balers (Bales under 200 lbs)	191	234	(18.4)
Forage Harvesters (Shear Bar Type)	64	85	(24.7)
Mower Conditioners	296	394	(24.9)

Mower-conditioners—down 25 percent at 296 units.

Part of the reason for the strong January numbers, according to one industry observer, is that sales by John Deere dealers in the second half of December were not included in that month because of Deere's holiday closing down, and were thus shown in January instead.

Briefly...

Mike Broeker has succeeded Joe Daniel as director and manager of Kubota Tractor Corp.'s Central Division at Dallas, Texas. Jack Cross is new assistant division manager. Broeker had been assistant division manager. Daniel will continue as a marketing consultant on special projects.

Saws, Trimmers, Blowers: Good '87, Better '88

Shipments of gasoline-powered portable power equipment—chain saws, trimmers and brushcutters, leaf blowers and generators—showed increases in 1987 over 1986 and are expected to increase again in 1988, according to the Portable Power Equipment Manufacturers Assn.

Chain saws: 1.35 million shipped in 1987, even with 1986. Estimated 1988 shipments—up 2 percent.

Trimmers/brushcutters: Estimated 1987 shipments, 2.748 million, up 15 percent from 1986. Shipment estimate for 1988—up 11 percent.

Hand-held leaf blowers: Estimated 1987 shipments, 397,000 units, up 18 percent on 1986. Estimated 1988 shipments, up 8 percent.

Safety Kit Offered

Point-of-purchase kits are being offered by the Outdoor Power Equipment Institute to retailers. The kits are designed to help retailers educate consumers about the importance of outdoor power equipment safety and include a poster, a banner, and a consumer handout. The kit is available from OPEI at 24500 Center Ridge Rd., Westlake, Ohio 44145.

INVENTORY WATCH

WHAT'S HAPPENING TO STOCKPILES IN RELATION TO SALES.

Equipment	Inventory Levels Dec. 31, 1986	 July 31, 1987	 Aug. 31, 1987	 Sept. 30, 1987	 Oct. 31, 1987	 Nov. 30, 1987	 Dec. 31, 1987	12-Month Sales, Jan. 1, 1987 Dec. 31, 1987
Tractors								
Under 40 hp	62,442	61,675	60,991	59,939	59,399	60,981	60,179	59,902
40-99 hp	23,520	20,644	20,464	19,999	18,996	19,622	20,042	30,718
100 hp and over	13,805	11,940	9,329	7,490	6,306	5,704	5,524	15,911
Four-wheel drive	1,660	1,469	1,415	1,534	1,474	1,598	1,697	1,653
Total Tractors	**101,427**	**95,728**	**92,199**	**88,962**	**86,175**	**87,905**	**87,442**	**108,184**
S-P Combines	4,271	5,871	5,893	5,344	4,496	4,044	3,588	7,172

Source: Farm & Industrial Equipment Institute

Outdoor Power Equipment Market Keeps Growing

THE LAWN and garden equipment business continues its steady pattern of growth. A quick look at that table showing the value of lawn and garden equipment shipments shows that the consumer products part has gone up by 56 percent and the commercial equipment part is up by 73 percent from 1982 to 1986.

In addition to the shipments data shown here up to 1986, the Outdoor Power Equipment Institute estimates that 1987 shipments rose in most categories over 1986 totals.

The OPEI estimates: Walk-behind power mowers, 5.9 million shipped, up 9 percent on 1986. Lawn tractors and riding mowers, front-engine type, 800,000, up 28 percent; rear engine type, 375,000, up 16 percent. Riding garden tractors, 150,000, up 1 percent. Rotary tillers, at 272,000 units, declined 12 percent.

The OPEI has proclaimed April to be Outdoor Power Equipment Safety month and the organization has persuaded many mayors and state governors to make similar proclamations.

According to William Rathke, OPEI safety education committee chairman and president of Western International, "Tens of thousands of retailers will talk to consumers at the local level and promote the importance of equipment safety.

"OPEI will also begin operating a Safety News Bureau, which will provide safety information to the general public and the media."

The bureau's number is 216-835-4000. ☐

Lawn and Garden Equipment: Value of Manufacturers' Shipments, 1982-86

(in millions)

Year	Commercial Lawn-Garden Equipment	Consumer Lawn-Garden Equipment
1982	$238	$2,248
1983	263	2,475
1984	334	2,978
1985	377	3,155
1986	412	3,403

Source: Current Industrial Reports, Series MA—35A, Bureau of the Census.

Lawn and Garden Equipment — Manufacturers' Shipments, 1984-1986

(in units)

	1986	1985	1984
SELECTED CONSUMER NON-RIDING LAWN, GARDEN AND SNOW EQUIPMENT			
Lawn mowers			
Push type, gas powered, reel	51,935	34,844	32,066
Push type, gas powered, rotary	3,660,058	3,567,467	3,452,606
Self-propelled, gas powered, rotary and electric types	1,880,015	1,671,101	1,799,902
Rotary garden motor tillers and 2-wheel walking type tractors	324,185	352,810	434,366
Snowthrowers, single stage	336,603	282,386	272,398
Snowthrowers, dual stage	201,826	156,669	140,315
Shredders and shredder-grinders	67,211	55,770	34,229
Yard vacuums, blowers, lawn sweepers (except attachment type)	951,472	1,125,579	766,522
Edgers and trimmers, powered fixed blade	468,642	572,588	NA
Other than fixed blade			
Gasoline	1,126,990	3,912,956	NA
Other, incl. electric	3,352,913		
SELECTED COMMERCIAL TURF AND GROUNDS MOWING AND CARE EQUIPMENT			
Powered non-riding mowers	59,303	58,455	69,304
Riding reel-type turf mowers and greens mowers	7,004	15,662	7,500
Riding rotary turf mowers	30,102	33,105	30,235
Gang rotary cutting units, reel and rotary, individual sections	34,327	14,290	14,503
Flail mower cutting units, including gang	3,332	4,578	3,965
Other mowing equipment	8,228	4,703	4,660
Dethatchers	2,561	3,372	3,982
Power brooms, blower vacuums, sweepers	9,630	5,742	8,608
Seeders, spreaders, top dresser attachments	29,880	NA	NA
SELECTED CONSUMER RIDING LAWN AND GARDEN EQUIPMENT			
Lawn tractors and riding mowers			
Front engine, under 10 HP	86,880	119,007	86,165
Front engine, 10 HP and over	539,446	454,734	413,937
Rear engine, under 8 HP	41,978	28,675	35,795
Rear engine, 8-9.9 HP	153,326	188,811	130,936
Rear engine, 10 HP and over	112,358	130,936	134,680
Garden tractors			
Under 14 HP	31,537	31,862	21,620
14-15.9 HP	10,946	11,261	7,937
16 HP and over	85,573	69,023	77,390

Source: Current Industrial Reports, Series MA-35A, Bureau of the Census.

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March 31, 1988

RED BOOK

March 31, 1988 • Vol. 103 • No. 4

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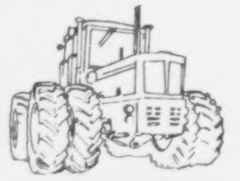

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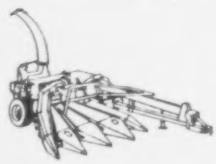

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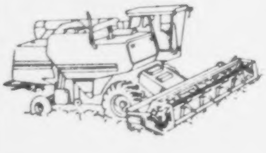

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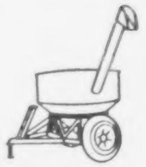

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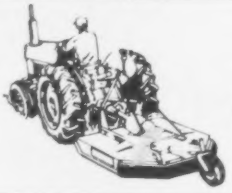

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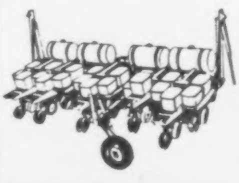

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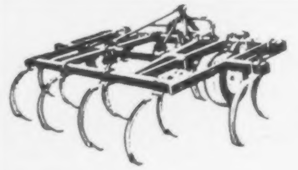

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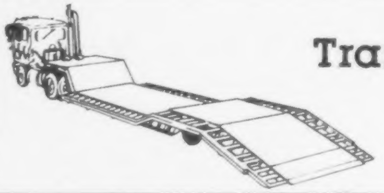

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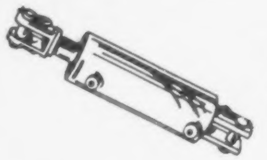

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Abbreviations:
DNA – Does not apply.
NA – Not available.
Std. – Standard.
Opt. – Optional
Linear measurements may be to nearest ¼-inch.

For addresses of manufacturers whose products are listed in this edition, refer first to advertiser's index and obtain address from advertisement. For non-advertisers and companies that do not show an address on their advertisement, refer to company name and address listing in I&T PRODUCT FILE (Annual October 31 issue).

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Ten-Year Summary of Test Reports, 1977-1986

Nebraska Tractor Test Results, normally published in each edition of RED BOOK, are not included in this edition and are replaced by the latest Ten-Year Test Result Summary. An explanation seems in order.

The Nebraska Tractor Test Law originated in 1919 for the purpose of verifying advertising claims on tractors offered for sale to Nebraska farmers. Its previous position as the only independent test laboratory in the U.S. devoted to the evaluation of tractor performance proved of unique value to the industry.

Other nations require third-party testing of tractors, and in the past, several nations with no test program had accepted Nebraska test results. Recently, however, more countries have built their own test facilities or adopted the test procedures of the Organization for Economic Cooperation and Development (OECD). OECD tests are similar to, but not exactly the same, as the SAE/ASAE procedures followed at Nebraska.

Manufacturers generally agree that tractors should be tested in their country of manufacture. For most of them, that would involve tests in Britain, France, Italy, Japan, West Germany and the U.S.

The additional costs associated with duplicate testing have caused some manufacturers to suspend sales of certain models in Nebraska rather than pay the extra cost.

In 1985 industry representatives began an effort to gain recognition for OECD tests in the U.S. The Farm and Industry Equipment Institute (FIEI) was subsequently named the "Designated Authority" for OECD testing. When the FIEI task force began considering possible tractor test organizations other than the University of Nebraska, the Nebraska legislature in early 1986 passed a law to accept results of either the current SAE/ASAE or OECD tractor tests.

Since no Nebraska tests were conducted in 1987 and given the ongoing changes and confusion in the current testing procedures, we have decided to forego publishing OECD test results in place of the Nebraska tests until such time as agreement can be reached among the farming and industry communities as to accepted testing procedures.

In lieu of current test results, we are reintroducing the Ten-Year Test Result Summary. This summary includes the most recent data available through the 1986 year and should provide additional, much needed information.

Ten-Year Summary of Test Reports, 1977-1986

						ENGINE									FUEL CONSUMPTION (HP Hours Per Gallon) at:-				
																PTO	—Varying Drawbar Power—		
MAKE AND MODEL OF TRACTOR	Test No.	Fuel Used	Weight With Ballast	Lbs. Ballest Carried	No. of Cyl-inders	Bore and Stroke	Dis-place-ment Cu. in.	Rated RPM	Max. PTO HP at Rated Engine RPM	Std. PTO RPM	Max. PTO HP Std. PTO RPM	Max. Draw-bar HP	MPH at Max. Dwbr. HP	Max. Lbs. Pull	Max. PTO HP at Std. PTO RPM	Average at Varying Power	Max. Avail-able Power	75% of Pull Max. Power	50% of Pull at Max. Power
Allis-Chalmers																			
5020	1270	Die.	3358	1298	2	3.62x3.74	77	2500	21.79	540	20.78	18.05	5.74	2346	13.99	10.99	11.07	10.51	8.62
5030	1271	Die.	3876	1346	2	3.82x3.94	90.1	2500	26.42	540	25.61	23.92	4.26	3389	13.82	11.28	11.64	11.48	9.68
5050	1240	Die.	7690	3280	3	4.055x4.33	168	2700	51.46	540	47.16	45.22	5.68	6075	16.10	12.42	12.58	13.01	11.24
6060 8 Speed	1397	Die.	8945	2480	4	3.876x4.25	200	2300	63.83	540	64.90	52.24	4.83	6846	16.26	12.07	13.27	11.99	10.10
6080 12 Speed	1398	Die.	11790	4200	4	3.876x4.25	200	2300	83.66	1000	74.49	72.32	5.74	9003	15.70	13.14	14.27	12.81	10.93
6140	1445	Die.	6195	1735	3	3.858x4.055	142	2500	41.08	541	38.04	33.97	5.20	4768	13.47	10.20	10.87	10.25	8.88
7010PD 20 Speed	1345	Die.	12790	1530	6	3.875x4.25	301	2300	106.53	1000	107.52	91.44	6.05	9426	15.48	11.57	12.59	11.48	9.68
7010PS 12 Speed	1346	Die.	12740	1365	6	3.875x4.25	301	2300	106.72	1000	106.33	91.61	6.11	9516	15.43	11.74	12.43	11.35	9.58
7020 Powershift	1259	Die.	15610	3840	6	3.875x4.25	301	2300	123.79	1000	123.50	105.36	6.59	12001	16.01	12.45	13.10	12.25	10.34
7020 Power Director	1260	Die.	15655	4085	6	3.875x4.25	301	2300	123.85	1000	125.51	107.36	6.83	11964	16.08	12.12	13.09	12.08	10.13
7045 Power Director	1261	Die.	18990	4745	6	4.25x5.00	426	2300	146.18	1000	146.46	127.84	7.04	15430	14.62	11.26	12.16	11.40	9.72
7045 Powershift	1308	Die.	18990	4390	6	4.25x5.00	426	2300	146.88	1000	146.67	127.61	6.92	15449	14.92	11.32	12.58	11.71	9.62
8010 Powershift	1446	Die.	13185	555	6	3.875x4.25	301	2300	107.38	1000	109.55	93.01	6.16	9102	15.01	11.49	12.57	11.48	9.54
8030 Powershift	1447	Die.	17100	2085	6	4.25x5.00	426	2300	133.75	1000	134.42	116.65	6.35	13348	15.25	11.78	12.93	11.87	10.00
8050 Powershift	1448	Die.	19380	4075	6	4.25x5.00	426	2300	152.40	1000	155.15	134.13	4.89	16728	15.88	12.51	13.71	12.73	10.80
8070 Powershift	1449	Die.	22370	5520	6	4.25x5.00	426	2400	170.72	1000	171.44	147.29	5.87	18777	16.48	12.81	13.67	12.59	10.64
8550	1262	Die.	29360	2320	6	5.250x5.625	731	2500	253.88	998	253.88	224.18	5.83	26220	14.57	10.94	12.47	11.45	9.35
Belarus																			
1500 12 Speed	1333	Die.	19885	1120	6	5.118x4.528	558	2100	168.76	1000	169.63	151.96	5.31	19311	16.48	13.69	14.53	13.98	12.25
7100 16 Speed	1334	Die.	32460	0	12	5.118x5.512	1360	1900	269.62	1003	269.62	259.46	4.78	30845	15.85	13.26	14.82	14.35	12.56
Big Bud																			
525/50 9 Speed	[illegible]	Die.	51920	0	6	6.25x6.25	1150	2100	---	---	---	421.49	5.64	42216	---	---	14.87	13.97	12.01
Case																			
1190 Manual	1378	Die.	6780	2160	3	3.939x4.500	165	2200	43.09	540	38.54	36.60	7.60	4620	14.99	13.09	12.22	12.59	11.39
1290 Manual	1379	Die.	9320	2750	4	3.939x4.000	195	2200	53.73	540	47.80	46.41	4.97	6851	15.20	13.34	12.41	12.90	11.68
1390 Manual	1380	Die.	9780	3160	4	3.939x4.500	219	2200	60.59	1000	58.40	52.16	4.92	7348	15.58	13.36	12.89	13.24	11.77
1490 Manual	1381	Die.	11305	3600	4	3.939x4.500	219	2200	70.51	1000	68.75	60.45	5.63	8340	17.18	13.62	13.62	13.00	11.25
1490 Powershift	1382	Die.	11060	2635	4	3.939x4.500	219	2200	70.91	1000	70.48	61.56	6.76	8405	16.42	12.36	13.12	12.01	10.20
1594 Synchro	1546	Die.	11100	1755	6	3.939x4.500	329	2300	85.90	1000	80.83	73.54	5.29	8331	17.04	14.04	14.26	13.56	11.99
1594 Powershift	1547	Die.	11210	1745	6	3.939x4.500	329	2300	85.54	1000	81.94	70.59	5.47	8198	16.86	13.52	13.59	13.10	11.45
1690 Manual	1383	Die.	12470	3715	6	3.939x4.500	329	2300	90.39	1000	87.76	78.08	4.27	10536	15.95	13.95	13.20	13.50	12.28
1896 Powershift	1548	Die.	13925	430	6	4.016x4.724	359	2100	95.92	997	95.92	86.45	4.77	12357	16.71	12.94	14.82	13.65	11.34
2090 Manual	1304	Die.	15030	3120	6	4.625x5.000	504	2100	108.74	998	108.74	95.31	7.10	11655	15.40	12.23	13.41	12.69	10.73
2090 Powershift	1295	Die.	15190	3160	6	4.625x5.000	504	2100	108.29	998	108.29	93.95	6.56	11211	14.94	11.77	12.49	11.96	10.14
2094 Powershift	1525	Die.	14750	560	6	4.625x5.000	504	2100	110.50	998	110.50	100.12	6.34	11910	15.40	12.26	13.81	12.93	11.27
2096 Powershift	1549	Die.	14940	760	6	4.016x4.724	359	2100	115.67	998	115.67	101.40	6.37	12915	17.38	14.01	15.21	13.92	11.95
2290 Manual	1296	Die.	15400	2630	6	4.625x5.000	504	2100	128.80	998	128.80	109.36	5.32	12635	14.52	11.66	12.46	11.73	10.07
2290 Powershift	1297	Die.	15840	2140	6	4.625x5.000	504	2100	129.08	998	129.08	111.68	6.25	12749	14.52	11.53	12.65	11.37	9.77
2294 Powershift	1526	Die.	15670	1280	6	4.625x5.000	504	2100	131.97	998	131.97	116.38	6.31	13017	14.86	11.82	13.11	12.21	10.51
2390 Powershift	1302	Die.	18710	3120	6	4.625x5.000	504	2100	160.72	1002	160.72	146.01	6.59	16020	15.23	12.41	13.20	12.66	10.99
2394 Powershift	1527	Die.	18595	2355	6	4.625x5.000	504	2100	162.15	1002	162.15	142.07	5.53	15497	15.46	12.70	13.42	12.71	11.04
2590 Powershift	1303	Die.	20500	4760	6	4.625x5.000	504	2100	180.38	1003	180.38	159.01	6.57	17865	15.53	12.97	13.42	13.03	11.67
2594 Powershift	1529	Die.	19790	3570	6	4.625x5.000	504	2100	182.07	1002	182.07	161.96	6.40	16874	15.22	12.88	13.37	12.94	11.63
2870	1241	Die.	28150	3050	6	5.000x5.710	673	2200	252.10	1009	252.10	219.61	5.72	26386	15.45	12.01	12.98	12.37	10.40
3294 Powershift	1528	Die.	17980	0	6	4.625x5.000	504	2100	162.63	998	162.63	143.68	5.75	16242	15.32	12.58	13.55	12.76	11.13
4490	1328	Die.	22450	1610	6	4.625x5.000	504	2200	175.20	1000	175.20	153.30	5.65	21400	15.27	12.36	13.30	12.52	10.87
4690	1329	Die.	25230	2920	6	4.625x5.000	504	2200	219.62	1000	219.62	195.60	5.97	24564	15.26	12.76	13.39	12.84	11.21
4890	1330	Die.	28460	2710	6	5.00x5.71	673	2200	253.41	1000	253.41	224.81	5.96	27627	16.32	13.02	14.19	13.27	11.36
4994 Powershift	1530	Die.	39930	8615	8	5.00x5.51	866	2100	344.04	991	344.04	306.43	7.20	34519	17.03	13.81	14.67	13.87	12.18

Case IH																			
685	1604	Die.	8845	3010	4	3.875x5.06	239	2400	61.02	540	58.80	54.63	5.42	7207	14.76	11.56	12.66	11.86	9.95
2394 Powershift	1582	Die.	18630	2230	6	4.625x5.00	504	2100	162.92	1002	162.92	148.98	5.12	17425	15.81	13.02	14.36	13.56	11.89
3394 Powershift	1583	Die.	18610	2810	6	4.625x5.00	504	2100	162.86	1002	162.86	144.82	5.08	17421	15.39	12.59	13.51	12.48	10.55
3594 Powershift	1584	Die.	20500	2910	6	4.625x5.00	504	2100	182.27	1002	182.27	165.12	5.07	20384	15.45	13.05	13.70	12.91	11.20
John Deere																			
750 8 Speed	1504	Die.	2150	155	3	3.15x3.35	78.2	2400	18.54	540	19.80	15.73	6.41	1661	15.06	11.61	12.48	11.53	9.83
850	1280	Die.	3528	982	3	3.15x3.35	78	2600	22.27	540	20.66	18.92	4.90	2699	14.26	11.51	11.23	11.22	10.21
950	1281	Die.	3615	803	3	3.54x3.54	105	2400	27.36	540	28.05	23.46	4.98	3056	14.68	12.36	12.42	12.23	10.63
1050	1327	Die.	4140	730	3	3.54x3.54	105	2400	33.41	540	33.42	28.15	5.27	3466	15.46	12.36	12.34	11.99	10.13
1250	1437	Die.	5180	90	3	3.74x4.33	143	2500	40.70	540	40.98	34.01	5.39	3750	17.00	13.56	13.90	12.71	10.68
1450 9 Speed	1505	Die.	6570	1340	4	3.74x4.33	190	2400	51.39	540	50.93	43.79	7.68	5321	17.60	14.01	14.74	13.67	11.64
1650 9 Speed	1506	Die.	7785	2435	4	3.74x4.33	190	2300	62.22	540	62.70	54.06	7.79	6572	18.81	15.53	15.96	14.97	12.95
2040 8 Speed	1350	Die.	6500	1465	3	4.19x4.33	179	2500	41.25	540	40.53	33.31	5.63	4873	15.62	11.73	12.02	11.35	9.03
2040 8 Speed TSS (1)	1393	Die.	6040	265	3	4.19x4.33	179	2500	40.44	540	40.22	33.21	5.16	5541	14.87	10.93	11.69	10.71	8.76
2150 16 Speed	1469	Die.	5930	820	3	4.19x4.33	179	2500	46.47	540	46.13	38.69	6.98	4875	14.77	11.15	11.88	11.24	9.47
2240 8 Speed TSS (1)	1394	Die.	6205	310	3	4.19x4.33	179	2500	50.90	540	49.20	42.13	5.08	5777	15.32	11.75	11.98	11.45	9.78
2350 16 Speed	1470	Die.	7190	380	4	4.19x4.33	239	2500	56.18	540	55.69	47.53	6.77	5688	15.67	11.66	12.96	11.87	9.87
2550 16 Speed	1471	Die.	8485	1575	4	4.19x4.33	239	2500	65.94	540	65.53	56.24	6.22	6979	15.42	11.85	12.83	12.09	10.10
2750 16 Speed	1472	Die.	9625	2125	4	4.19x4.33	239	2500	75.35	540	75.07	63.98	4.75	7581	16.11	12.29	13.13	12.37	10.51
2755	1605	Die.	9715	1170	4	4.19x4.33	239	2300	76.57	1000	77.63	66.05	5.18	7498	17.82	14.04	14.87	14.19	12.14
2840	1249	Die.	10500	1695	6	4.020x4.330	329	2500	80.65	1000	76.27	67.47	6.21	8386	16.02	11.52	12.36	11.57	9.59
2940 16 Speed	1351	Die.	10650	1215	6	4.19x4.33	359	2500	81.17	1000	81.46	67.98	4.64	7601	15.91	11.73	12.81	11.91	9.91
2950 16 Speed	1473	Die.	11045	945	6	4.19x4.33	359	2500	85.37	1000	85.50	73.30	6.57	8768	16.33	12.21	13.58	12.45	10.53
2955	1606	Die.	11150	130	6	4.19x4.33	359	2300	86.22	1000	85.54	74.20	5.42	9971	17.41	13.63	14.82	13.79	11.64
3150	1589	Die.	12300	355	6	4.19x4.33	359	2400	96.06	1000	96.06	83.04	5.64	10507	16.45	13.09	14.23	13.34	11.21
4040	1267	Die.	12055	1165	6	4.25x4.75	404	2200	90.80	1002	90.80	77.85	6.36	8936	13.49	10.59	11.24	10.96	9.21
4040 Syncro Range	1359	Die.	12090	1600	6	4.25x4.75	404	2200	90.31	1002	90.31	77.04	8.14	9035	13.87	10.85	11.68	11.29	9.70
4040 Powershift	1360	Die.	12080	1590	6	4.25x4.75	404	2200	90.79	1000	90.88	78.54	4.45	9195	13.54	10.79	11.50	11.35	9.55
4050 Quad	1474	Die.	13005	835	6	4.57x4.75	466	2200	101.49	1002	101.49	92.05	6.49	10331	15.12	11.72	13.44	12.54	10.64
4050 Quadrange	1590	Die.	13670	1280	6	4.19x4.33	359	2200	105.89	1000	105.89	96.35	5.86	11381	17.23	13.60	15.34	14.25	12.13
4050 Powershift	1457	Die.	13030	310	6	4.57x4.75	466	2200	100.95	1002	100.95	88.75	7.88	11058	15.08	11.59	12.60	11.69	9.65
4050 Powershift	1591	Die.	13685	1000	6	4.19x4.33	359	2200	105.69	1000	105.69	91.64	8.51	11378	17.40	13.78	14.61	13.47	10.99
4240	1266	Die.	14090	1695	6	4.57x4.75	466	2200	110.94	1002	110.94	95.18	5.42	11492	14.33	11.09	12.05	11.35	9.52
4240 Syncro Range	1361	Die.	14240	2430	6	4.56x4.75	466	2200	110.81	1002	110.81	95.40	4.90	12240	14.17	11.08	12.00	11.47	9.81
4240 Powershift	1362	Die.	14260	2440	6	4.56x4.75	466	2200	111.06	1000	11.43	95.65	4.51	12450	14.39	11.25	12.13	11.65	10.13
4250 Quad	1475	Die.	14990	1620	6	4.57x4.75	466	2200	120.21	1002	120.21	108.77	5.71	12858	15.70	12.21	13.90	12.82	10.64
4250 Powershift	1458	Die.	14970	1115	6	4.57x4.75	466	2200	120.86	1002	120.86	105.11	8.36	12802	15.78	12.33	13.44	12.08	10.17
4440	1265	Die.	15540	2270	6	4.57x4.75	466	2200	130.58	1002	130.58	112.56	5.02	13392	15.21	11.73	12.69	11.83	9.90
4440 Powershift	1357	Die.	15775	2655	6	4.57x4.75	466	2200	130.41	1010	130.41	114.16	4.53	13738	15.32	11.83	13.15	12.22	10.60
4450 Quad	1476	Die.	16680	2380	6	4.57x4.75	466	2200	140.33	1002	140.33	125.18	5.01	15069	16.36	13.08	14.42	13.45	11.61
4450 Quad (2)	1476	Die.	16760	2005	6	4.57x4.75	466	2200	140.33	1002	140.33	126.34	5.37	16278	16.36	13.08	14.68	---	---
4450 Powershift	1459	Die.	16745	1795	6	4.57x4.75	466	2200	140.43	1002	140.43	121.94	8.03	15014	16.15	12.94	13.63	12.58	10.60
4450 Powershift (2)	1459	Die.	16625	1225	6	4.57x4.75	466	2200	140.43	1002	140.43	122.51	8.78	16154	16.15	12.94	13.66	---	---
4640	1264	Die.	18120	0	6	4.57x4.75	466	2200	156.30	998	156.30	134.70	6.45	15362	15.61	12.29	13.30	12.15	10.32
4640 Powershift	1358	Die.	18585	2805	6	4.57x4.75	466	2200	155.96	1000	157.01	137.04	4.81	15989	15.87	12.17	13.53	12.55	10.78
4650 Quad	1477	Die.	19615	1615	6	4.57x4.75	466	2200	165.70	998	165.70	145.58	6.45	16814	16.99	13.90	14.80	13.81	12.11
4650 Quad (2)	1477	Die.	19590	1150	6	4.57x4.75	466	2200	165.70	998	165.70	147.71	5.73	18931	16.99	13.90	14.93	---	---
4650 Powershift	1460	Die.	19660	1075	6	4.57x4.75	466	2200	165.52	998	165.52	143.33	8.12	16746	16.96	13.78	14.25	13.15	11.31
4650 Powershift (2)	1460	Die.	19740	695	6	4.57x4.75	466	2200	165.52	998	165.52	146.06	8.47	18794	16.96	13.78	14.44	---	---
4840	1263	Die.	20370	2240	6	4.57x4.75	466	2200	180.63	1000	181.63	157.09	4.76	17307	15.85	12.47	13.35	12.54	10.74
4850 Powershift	1461	Die.	21435	2715	6	4.57x4.75	466	2200	192.99	998	192.99	171.27	8.04	18789	17.47	14.50	14.68	13.80	12.01
4850 Powershift (2)	1461	Die.	21440	2280	6	4.57x4.75	466	2200	192.99	998	192.99	172.60	4.26	20810	17.47	14.50	14.93	---	---
8440	1323	Die.	26590	0	6	4.57x4.75	466	2100	179.83	993	179.83	163.26	4.97	25383	15.86	12.55	14.29	13.06	11.25
8450	1436	Die.	29150	0	6	4.57x4.75	466	2100	186.98	993	186.98	175.73	4.50	26567	15.69	12.91	14.45	13.53	11.63
8640	1324	Die.	28270	0	6	5.125x5.00	619	2100	228.75	993	228.75	208.38	4.63	27782	15.61	12.40	14.06	13.14	11.16
8650	1435	Die.	30270	0	6	5.125x5.00	619	2100	238.56	993	238.56	221.80	5.55	28257	15.53	12.65	14.26	13.22	11.52
8850	1434	Die.	37700	0	8	5.51x5.00	995	2100	303.99	996	303.99	274.25	5.23	35330	15.74	12.82	14.06	13.34	11.65

(1) With mechanical front wheel drive. (2) Supplementary test with radial ply tires.

Ten-Year Summary of Test Reports, 1977-1986

						ENGINE										FUEL CONSUMPTION (HP Hours Per Gallon) at:-			
MAKE AND MODEL OF TRACTOR	Test No.	Fuel Used	Weight With Ballast	Lbs. Ballest Carried	No. of Cyl-inders	Bore and Stroke	Dis-place-ment Cu. in.	Rated RPM	Max. PTO HP at Rated Engine RPM	Std. PTO RPM	Max. PTO HP Std. PTO RPM	Max. Draw-bar HP	MPH at Max. Dwbr. HP	Max. Lbs. Pull	Max. PTO HP at Std. PTO RPM	PTO Average at Varying Power	—Varying Drawbar Power— Max. Avail-able Power	75% of Pull Max. Power	50% of Pull at Max. Power
Deutz																			
DX-90	1305	Die.	13150	3210	5	3.94x4.72	287	2300	84.47	1000	80.82	74.19	6.53	8786	16.45	14.15	13.81	14.07	12.39
DX-110	1306	Die.	14940	2360	6	3.94x4.72	345	2300	100.29	1000	93.61	90.82	7.00	11773	15.10	13.71	13.52	14.03	12.60
DX-120	1405	Die.	14950	1980	6	4.02x4.92	374	2400	111.29	1000	101.90	97.41	7.32	12615	16.40	13.84	13.59	13.48	12.03
DX-130	1404	Die.	17630	3690	6	4.02x4.92	374	2300	121.27	1000	121.36	105.63	4.76	14406	17.63	13.77	14.14	13.10	11.26
DX-160	1307	Die.	18710	3870	6	4.02x4.92	374	2200	145.41	1000	140.99	124.81	6.41	15172	17.82	14.47	14.56	13.95	11.93
Deutz Allis																			
7085	1575	Die.	13660	3580	4	4.02x4.92	249	2300	85.18	1000	84.35	74.24	7.37	8417	16.89	14.03	14.40	13.76	12.00
7120	1576	Die.	17595	5465	6	4.02x4.92	374	2300	122.06	1000	123.15	103.63	6.20	10734	17.15	13.63	14.20	12.98	11.36
Deutz Fahr																			
DX 3.50	1574	Die.	8790	1530	3	4.02x4.92	187	2500	57.09	540	55.35	49.38	5.98	5587	15.47	13.20	12.95	13.46	11.63
DX 6.50	1576	Die.	17595	5465	6	4.02x4.92	374	2300	122.06	1000	123.15	103.63	6.20	10734	17.15	13.63	14.20	12.98	11.36
DX 4.70	1575	Die.	13660	3580	4	4.02x4.92	249	2300	85.18	1000	84.35	74.24	7.37	8417	16.89	14.03	14.40	13.76	12.00
Fiat																			
420	1293	Die.	6035	2115	3	3.74x4.33	143	2200	41.34	540	37.45	37.71	5.65	5299	14.81	12.93	13.30	13.92	12.35
580	1292	Die.	9210	2580	3	4.055x4.33	168	2700	51.61	540	48.42	44.20	3.38	8899	14.93	12.59	12.14	12.70	10.50
780	1294	Die.	10230	2830	4	4.055x4.33	224	2500	70.36	540	66.30	64.43	4.06	7776	15.41	13.62	13.93	14.17	12.50
Ford																			
1510 (12x4) Manual	1500	Die.	3205	975	3	3.03x3.15	68.2	2800	19.72	540	20.45	16.99	6.92	1952	13.21	10.32	11.14	10.26	8.50
1510 (12x4) Synchro	1501	Die.	3200	915	3	3.03x3.15	68.2	2800	19.98	540	18.68	16.83	6.70	1900	13.50	10.29	10.97	10.27	8.57
1700	1325	Die.	3725	1110	2	3.54x3.94	77.6	2500	23.26	540	23.02	20.21	5.54	2801	13.02	11.21	10.89	11.48	10.41
1710 (12x4) Manual	1502	Die.	3510	1040	3	3.31x3.31	85.2	2700	23.88	540	22.19	21.02	7.06	2700	13.42	10.16	11.36	10.76	8.98
1710 (12x4) Synchro	1503	Die.	3530	1060	3	3.31x3.31	85.2	2700	23.79	540	22.34	21.23	5.68	2680	13.18	9.92	11.04	10.56	8.81
1900	1326	Die.	4160	1225	3	3.35x3.31	87.2	2800	26.88	540	25.68	23.49	6.20	2964	12.58	10.38	10.41	10.89	9.32
1910 (12x4) Manual	1507	Die.	4250	1270	3	3.346x3.937	103.9	2500	28.60	540	28.29	25.57	6.78	3340	12.79	10.32	11.14	10.86	9.17
1910 (12x4) Synchro	1508	Die.	4325	1285	3	3.346x3.937	103.9	2500	28.52	540	28.30	25.62	6.79	3449	12.61	10.36	10.99	10.78	9.09
2110 (12x4) Manual	1509	Die.	5105	1470	4	3.346x3.937	138.5	2500	34.79	540	34.91	30.80	7.01	3868	14.01	10.69	11.80	10.95	9.04
2110 (12x4) Synchro	1510	Die.	5110	1450	4	3.346x3.937	138.5	2500	35.11	540	35.56	31.11	6.99	3728	14.01	10.71	11.77	11.11	9.35
2610 (8x2)	1421	Die.	5940	1780	3	4.20x4.20	175	2000	36.69	540	35.14	31.45	5.52	4473	16.15	12.82	13.03	12.71	10.51
2810	1573	Die.	5935	1295	3	4.20x3.80	158	2000	32.83	540	31.82	29.14	5.88	4036	15.20	11.57	12.88	11.99	9.96
2910 (8x2)	1491	Die.	5925	1295	3	4.20x4.20	175	2000	36.62	540	35.09	30.45	5.77	4237	16.04	12.51	13.18	12.31	11.59
2910 (8x4)	1492	Die.	5955	1305	3	4.20x4.20	175	2000	36.40	540	34.75	31.03	5.68	4223	15.95	12.58	13.00	12.24	10.69
3610 (8x2)	1422	Die.	6340	2070	3	4.40x4.20	192	2000	42.26	540	40.17	36.80	5.85	4964	15.95	12.65	13.37	12.69	11.20
3610 (8x4)	1423	Die.	6340	2045	3	4.40x4.20	192	2000	42.47	540	40.01	35.57	8.55	4917	16.26	12.94	12.85	12.44	10.53
3910 (8x2)	1493	Die.	6440	1760	3	4.40x4.20	192	2000	42.62	540	40.39	37.02	5.93	4931	15.86	12.48	13.33	12.66	10.71
3910 (8x4)	1494	Die.	6435	1735	3	4.40x4.20	192	2000	42.67	540	41.16	36.22	5.85	4934	15.64	12.63	13.16	12.34	10.59
4110 (8x2)	1424	Die.	7500	2850	3	4.40x4.40	201	2200	48.33	540	42.65	41.25	4.51	5681	16.37	12.64	13.26	12.34	10.76
4110 (8x4)	1425	Die.	7500	2785	3	4.40x4.40	201	2200	49.26	540	44.06	40.59	4.92	5691	16.06	12.32	12.92	12.13	10.44
4610 (8x2)	1426	Die.	8190	3095	3	4.40x4.40	201	2200	52.52	540	46.72	44.51	5.17	6402	16.78	13.17	13.96	13.25	11.60
4610 (8x4)	1427	Die.	8230	3085	3	4.40x4.40	201	2200	52.32	540	47.30	43.26	5.62	6534	16.83	13.05	13.53	12.77	11.18
5610 (16x4)	1428	Die.	9700	2325	4	4.40x4.20	256	2100	62.54	540	60.58	54.63	5.69	7408	15.57	12.38	12.82	12.44	10.30
5610 (16x8)	1429	Die.	9545	3130	4	4.40x4.20	256	2100	62.57	540	59.99	53.70	6.57	7578	15.45	12.11	12.93	12.03	10.09
6610 (16x4)	1430	Die.	9700	2270	4	4.40x4.40	268	2100	72.13	540	68.27	61.17	5.62	7887	15.64	13.14	13.40	12.90	10.77
6610 (16x8)	1431	Die.	9700	2850	4	4.40x4.40	268	2100	72.30	540	69.20	62.64	6.49	7948	15.43	12.91	13.18	12.84	10.87
6700 16-Speed	1244	Die.	9690	1180	4	4.40x4.20	256	2100	68.94	1000	68.62	58.06	7.55	6787	13.77	12.23	11.24	12.38	11.16
7610 (16x4)	1432	Die.	10800	2220	4	4.40x4.40	268	2100	86.95	1000	86.79	74.22	5.53	8804	15.75	12.44	13.36	12.29	10.35

7700 16-Speed	1242	Die.	10800	2400	4	4.40x4.20	255	2100	84.38	1000	84.29	71.57	7.28	7688	15.24	11.65	11.92	11.21	9.71
7710 (16x8)	1433	Die.	10800	2150	4	4.40x4.40	268	2100	86.62	1000	86.55	73.24	6.42	8638	15.87	12.60	13.67	12.26	10.35
8700 16-Speed	1245	Die.	14760	2490	6	4.40x4.40	401	2300	110.58	1000	99.56	100.12	6.94	11581	15.02	11.91	12.37	12.28	10.93
9700 16-Speed	1243	Die.	17480	4620	6	4.40x4.40	401	2200	135.64	1000	129.25	118.08	6.55	15010	15.95	11.77	12.63	11.97	10.34
TW-5	1514	Die.	14430	1340	6	4.40x4.40	401	2300	105.74	1000	96.83	95.27	8.52	12249	15.52	12.42	13.14	12.91	11.38
TW-10	1301	Die.	15190	2325	6	4.40x4.40	401	2300	110.24	1000	101.09	97.35	5.23	12006	14.86	11.50	12.17	11.91	10.20
TW-15	1515	Die.	16010	2755	6	4.40x4.40	401	2200	121.40	1000	117.83	107.24	8.09	13247	16.90	12.39	13.83	12.80	10.88
TW-15 FWD (2)	1536	Die.	16680	2310	6	4.40x4.40	401	2200	121.25	1000	115.58	107.35	5.21	15939	16.95	12.39	13.96	12.65	10.68
TW-20	1300	Die.	17180	3945	6	4.40x4.40	401	2200	135.60	1000	131.43	121.47	7.85	14155	16.22	11.78	13.08	12.04	10.09
TW-25	1516	Die.	17965	2530	6	4.40x4.40	401	2200	140.68	1000	135.70	126.73	5.25	14871	16.66	12.58	13.89	13.02	11.20
TW-30	1299	Die.	19830	5205	6	4.40x4.40	401	2200	163.28	1000	157.04	144.17	8.32	16553	16.76	12.49	13.67	12.58	10.79
TW-35	1517	Die.	20270	4090	6	4.40x4.40	401	2200	170.30	1000	166.67	147.49	5.30	17054	17.41	13.81	14.31	13.91	12.18
TW-35 FWD (2)	1537	Die.	20270	3130	6	4.40x4.40	401	2200	171.12	1000	162.55	147.55	5.44	18823	17.58	14.09	14.42	13.71	12.04
FW-20	1291	Die.	31000	1385	8	4.625x4.125	555	2850	---	---	---	156.85	5.45	27155	---	---	12.12	11.69	10.15
FW-30	1288	Die.	31720	410	8	5.500x4.750	903	2600	(1)	---	---	212.02	6.64	27803	---	---	13.71	12.24	10.08
FW 30 without PTO												220.38	5.85	28302	---	---	14.16	12.73	10.96
FW40	1290	Die.	32950	2320	8	5.500x4.750	903	2600	---	---	---	238.78	6.60	28245	---	---	13.83	12.84	10.73
FW60	1289	Die.	33970	2870	8	5.500x4.750	903	2600	---	---	---	285.57	7.45	29304	---	---	14.90	13.38	11.27

(1) Equipped with controlled, hydrostatic pto with 105 output horsepower at 1000 rpm. (2) Drawbar test with front wheel assist engaged.

Hesston Fiat																			
466 12 Speed	1484	Die.	6670	950	3	3.94x4.33	158	2600	45.13	540	42.68	40.03	5.79	4969	16.74	12.41	13.66	12.87	10.95
480-8 DT and 480-8 12 & 8 Speed	1385	Die.	7805	2485	3	3.94x4.33	158	2600	42.58	540	40.36	37.07	5.07	5265	16.93	12.27	13.34	12.54	10.64
45-66DT	1579	Die.	5400	950	3	3.937x4.528	165	2500	39.49	540	37.97	31.71	4.32	3148	16.65	12.11	12.36	11.23	9.46
55-66DT	1560	Die.	6570	1105	3	3.937x4.528	165	2500	45.78	540	44.84	38.39	5.64	4608	16.36	12.77	12.98	12.80	11.27
60-66 DT	1531	Die.	7460	1580	3	4.094x4.527	178.8	2500	51.49	540	48.51	45.51	5.53	3031	17.13	13.11	14.19	13.30	11.38
70-66DT	1561	Die.	8705	2015	4	3.937x4.528	220.5	2500	62.72	1000	62.71	54.40	5.52	6217	17.20	13.67	14.64	13.61	11.54
70-90	1562	Die.	7775	490	4	3.937x4.528	220.5	2500	62.25	1000	61.94	54.64	5.62	6238	16.52	13.28	14.04	13.46	11.82
80-90	1563	Die.	9465	2155	4	4.094x4.527	238.5	2500	70.86	1000	69.25	61.52	5.56	7323	17.43	13.96	14.76	14.09	12.28
100-90	1580	Die.	11580	1860	6	3.937x4.527	331	2500	91.52	1000	90.57	79.42	6.07	7383	16.24	12.93	13.62	12.76	10.68
666 12 Speed	1485	Die.	8715	2425	4	3.94x4.33	211	2500	62.40	540	60.33	54.31	5.51	5833	17.00	13.00	13.79	13.20	11.73
680DT & 680 8 Speed	1352	Die.	10000	2660	4	3.94x4.33	211	2500	62.47	1000	61.20	53.65	5.44	6252	17.40	14.19	14.80	14.20	12.45
780 DT and 780 8-Speed	1386	Die.	10100	3920	4	4.055x4.33	224	2500	70.57	540	66.67	62.06	7.61	6965	16.71	13.96	13.72	13.86	12.26
80-66 DT	1532	Die.	9400	2685	4	4.094x4.527	238.5	2500	70.43	1000	68.91	62.73	5.47	4260	17.60	14.08	14.96	14.21	12.66
880 DT-5 & 880-5 12 Speed	1353	Die.	11560	2810	5	4.055x4.331	280	2500	81.32	1000	80.95	70.73	7.63	7554	16.27	13.23	13.50	13.44	11.65
980DT & 980 16 Speed	1354	Die.	12645	3795	6	3.937x4.33	316	2400	91.12	996	91.12	77.42	5.00	8351	16.90	13.92	14.25	13.59	12.25
1180 DT Turbo	1450	Die.	16885	1935	6	4.055x4.33	335	2550	107.48	1000	104.22	93.71	4.37	12905	16.40	12.54	14.16	12.74	10.42
1380DT, 1380	1409	Die.	16995	1795	6	4.055x4.33	335	2400	123.16	1000	123.54	104.97	8.08	13105	16.49	13.30	13.60	13.01	11.62
130-90DT Turbo	1564	Die	16385	660	6	4.094x4.527	358	2500	107.48	1000	106.80	90.77	5.12	11805	16.43	12.07	13.83	12.17	9.85
140-90 DT Turbo	1533	Die.	16425	375	6	4.094x4.527	358	2500	123.35	1000	122.83	105.81	5.05	12687	17.12	13.04	14.40	13.16	11.13
1580DT Turbo	1451	Die.	19060	2460	6	4.528x5.118	494	2200	141.44	1000	136.14	124.15	5.48	15342	17.28	13.49	14.70	13.53	11.47
160-90 DT Turbo	1534	Die.	18370	1075	6	4.528x5.118	494	2200	141.71	1000	143.91	122.23	5.32	13848	17.53	13.61	14.38	13.62	11.84
160-90 Powershift	1603	Die.	18220	300	6	4.528x5.118	494	2200	142.64	1000	141.40	126.34	4.44	18256	17.35	13.87	14.53	13.58	12.07
1880DT, 1880	1410	Die.	19710	3020	6	4.528x5.118	494	2200	162.48	1000	159.83	138.81	5.44	15656	17.86	14.13	14.82	14.25	12.29
180-90 DT Turbo	1535	Die.	19725	2430	6	4.528x5.118	494	2200	162.87	1000	158.66	140.45	6.40	14713	16.77	13.07	14.03	13.30	11.06
180-90 Turbo P.S.	1581	Die.	19570	1745	6	4.528x5.118	494	2200	162.15	1000	161.07	141.63	5.33	14920					
International Harvester																			
Hydro 84	1316	Die.	9120	3115	4	3.937x5.062	246	2400	58.73	540	56.68	43.59	7.60	6572	14.01	10.50	10.13	9.82	8.34
Hydro 86	1337	Die.	10710	2545	6	3.875x4.375	310	2400	70.89	540	66.64	54.10	4.03	8815	14.18	10.23	9.92	9.55	8.24
Hydro 186	1257	Die.	13430	295	6	4.300x5.000	436	2400	105.02	1000	100.31	82.77	6.56	11312	13.68	10.06	9.83	9.83	8.46
284	1277	Gas.	3596	1166	4	2.756x2.992	71.3	2600	25.75	1000	24.33	20.64	4.02	2561	11.62	9.54	9.77	8.97	7.52
284 8 Speed	1387	Die.	3600	860	3	3.27x3.94	99	2600	27.47	540	23.92	23.52	5.71	2523	14.40	10.91	10.99	10.53	9.18
484 Utility	1312	Die.	7710	2710	3	3.875x5.06	179	2200	42.42	540	41.79	38.06	4.78	5500	14.81	11.85	12.75	12.39	10.63
584 Utility & Rowcrop	1313	Die.	8850	3185	4	3.875x4.38	206	2300	52.54	540	50.96	47.47	5.07	6859	15.23	12.34	13.41	12.95	11.10
684 Utility & Rowcrop	1314	Die.	9660	3825	4	3.875x5.06	239	2400	62.52	540	58.75	55.92	5.29	6858	15.55	12.21	13.27	13.02	11.28
686 10 Speed	1336	Die.	10340	2360	6	3.875x4.375	310	2000	66.36	543	66.36	58.81	5.08	8043	16.07	13.16	13.93	13.27	11.53
784 Rowcrop	1315	Die.	9920	3830	4	3.937x5.062	246	2400	67.48	1000	64.09	58.65	5.18	8105	16.06	12.75	13.25	12.77	11.07
786 16 Speed	1388	Die.	11930	340	6	3.875x5.0625	358	2400	80.20	1000	77.41	70.25	4.74	9968	15.72	11.40	12.72	11.88	10.00
884 Rowcrop	1376	Die.	10150	3945	4	3.937x5.51	268	2400	72.91	1000	69.76	65.39	5.54	8116	15.76	12.47	13.48	12.91	11.05

(continued)

Ten-Year Summary of Test Reports, 1977-1986

						ENGINE									FUEL CONSUMPTION (HP Hours Per Gallon) at:-				
																PTO	—Varying Drawbar Power—		
MAKE AND MODEL OF TRACTOR	Test No.	Fuel Used	Weight With Ballast	Lbs. Ballest Carried	No. of Cylinders	Bore and Stroke	Displacement Cu. in.	Rated RPM	Max. PTO HP at Rated Engine RPM	Std. PTO RPM	Max. PTO HP Std. PTO RPM	Max. Drawbar HP	MPH at Max. Dwbr. HP	Max. Lbs. Pull	Max. PTO HP at Std. PTO RPM	Average at Varying Power	Max. Available Power	75% of Pull Max. Power	50% of Pull at Max. Power
International Harvester (cont.)																			
886	1254	Die.	13040	970	6	3.875x5.085	360	2400	86.14	1000	83.16	76.16	4.70	10485	14.29	10.55	11.77	10.92	9.21
886 16 Speed	1338	Die.	13450	1710	6	3.875x5.063	358	2400	86.57	1000	83.91	76.25	4.69	10807	16.01	11.77	12.97	12.21	10.62
886 16 Speed (1)	1339	Die.	13450	1710	6	3.875x5.063	358	2400	90.56	1000	88.23	80.13	4.69	10930	15.84	11.98	12.81	12.38	10.86
(1) Serial No. 2490208 U17026 and up.																			
986	1255	Die.	14000	970	6	4.30x5.00	436	2400	105.68	1000	104.18	94.60	4.98	12176	15.56	11.34	12.65	11.72	10.02
1086 w/Radial Tires	1247	Die.	15640	2915	6	4.30x4.75	414	2400	131.41	1000	133.67	116.28	4.40	13503	16.39	11.90	13.28	12.36	10.45
1086 w/Bias Ply Tires	1247	Die.	15640	3100	6	4.30x4.75	414	2400	131.41	1000	133.67	114.14	6.66	12137	16.39	11.90	12.83	12.08	10.52
1586 w/Radial Tires	1248	Die.	17600	2480	6	4.30x5.00	436	2500	161.55	1000	156.09	140.65	5.55	16665	16.51	12.28	13.02	12.38	10.51
1586 w/Bias Ply Tires	1248	Die.	17600	3010	6	4.30x5.00	436	2500	161.55	1000	156.09	140.08	6.05	15124	16.51	12.28	12.74	12.38	10.54
3088 16 Speed	1551	Die.	12500	560	6	3.875x5.062	358	2400	81.35	1000	80.28	71.20	5.16	5100	16.03	11.36	12.84	11.59	9.76
3288	1438	Die.	13560	1800	6	3.87x5.062	358	2400	90.46	1000	88.33	80.72	6.11	11486	15.94	11.69	13.16	12.31	10.27
3388	1319	Die.	17850	430	6	4.30x5.00	436	2400	130.61	1000	128.59	114.42	6.67	16764	16.85	12.00	13.52	12.17	10.09
3488 Hydro	1439	Die.	13940	1060	6	4.30x5.35	466	2400	112.56	1000	107.11	83.43	6.50	12152	15.28	10.64	10.00	9.73	8.43
3588	1320	Die.	18890	1270	6	4.30x5.35	466	2400	150.41	1000	152.07	130.94	6.65	17589	16.98	12.19	13.13	12.20	10.30
3688	1440	Die.	14335	1135	6	4.30x5.00	436	2400	113.72	1000	112.48	100.28	7.36	12250	15.75	11.82	13.30	12.35	10.38
3788 12 Speed	1377	Die.	20820	2200	6	4.30x5.35	466	2500	170.57	1000	166.39	146.43	7.49	19069	17.12	12.22	13.24	12.25	10.06
4386	1256	Die.	24930	0	6	4.30x5.35	466	2600	...	...	...	176.02	8.71	23321	...	...	12.43	11.92	10.18
4786	1317	Die.	34350	4150	8	5.31x4.50	798	2600	...	...	...	265.55	4.79	33468	...	...	12.80	11.92	9.86
5088 (2)	1419	Die.	16250	240	6	4.30x5.00	436	2400	136.12	1005	136.12	121.17	5.06	14960	15.32	11.65	13.23	12.04	9.90
5288	1420	Die.	18585	1530	6	4.30x5.35	466	2400	162.60	1005	162.60	142.37	5.27	17577	16.07	12.62	13.70	12.77	10.75
5483	1441	Die.	20005	2765	6	4.30x5.35	466	2400	187.22	1005	187.22	164.82	5.27	18646	16.20	13.00	14.16	13.15	11.21
(2) Drawbar information is from test run with radial ply tires.																			
Kubota																			
L185	1285	Die.	3370	1430	2	3.000x3.23	45.3	2800	15.33	540	14.07	13.03	5.57	1939	13.60	10.90	10.38	10.82	9.26
L185DT	1286	Die.	3415	1283	2	3.000x3.23	45.3	2800	15.45	540	14.16	12.58	3.74	1871	13.49	11.00	10.22	10.53	9.04
L235	1406	Die.	3715	1280	3	3.00x3.23	68	2600	19.59	540	19.63	16.05	4.68	2440	14.33	11.34	11.33	10.85	9.23
L245	1283	Die.	3694	1498	3	3.00x3.23	68	2800	22.06	540	20.11	18.66	5.74	2067	13.98	11.07	10.74	10.70	9.16
L245DT	1284	Die.	3792	1410	3	3.00x3.23	68	2800	22.35	540	20.15	18.55	5.78	1903	14.33	11.21	10.97	10.61	9.37
L275	1407	Die.	4055	1430	3	3.23x3.23	79.3	2600	23.42	540	23.01	19.70	4.84	2717	14.57	11.55	11.62	11.07	9.95
L295DT and																			
L295 8 Speed	1370	Die.	4700	1805	3	3.23x3.23	79.3	2800	26.46	540	24.91	22.82	4.34	3155	14.59	11.75	11.57	11.39	9.58
L305DT and																			
L305 8 Speed	1371	Die.	5360	2070	3	3.23x3.23	79.3	2800	26.21	540	25.14	22.96	4.16	3918	13.83	11.14	11.15	11.13	9.46
L345DT and															12.76	10.58	10.68	10.81	9.15
L345 8 Speed	1372	Die.	5435	2000	4	3.00x3.23	90.7	2800	29.35	540	28.80	26.72	4.62	3795	17.18	13.38	13.46	12.36	10.67
L2250 4WD	1585	Die.	3130	530	3	3.23x3.23	79.3	2600	21.15	540	21.45	17.28	5.04	2103	16.52	13.37	13.27	12.39	10.55
L2550 4WD	1586	Die.	3850	1100	3	3.35x3.23	85.1	2600	23.98	541	24.24	20.23	5.22	2446	16.98	13.07	13.49	12.68	10.92
L2850 4WD	1587	Die.	4580	1615	4	3.23x3.23	105.7	2600	27.51	540	27.96	2402	5.02	3143	17.13	13.52	13.32	12.78	11.08
L3350 4WD	1588	Die.	5340	1155	4	3.35x3.23	113.6	2600	32.86	540	33.29	27.49	4.92	3434	17.12	13.24	13.14	12.81	11.07
L4150 4WD	1556	Die.	6365	1840	5	3.35x3.23	142	2600	40.64	540	40.22	34.50	5.47	4257	17.19	13.48	13.80	12.92	11.16
M4030DT	1594	Die.	7375	2415	6	3.23x3.23	158	2600	44.05	540	44.08	36.91	6.02	4005					
M4050DT and															15.06	11.57	11.67	11.52	9.88
M4050 8 Speed	1495	Die.	7215	2275	6	3.23x3.23	158.5	2600	45.74	540	42.10	37.61	5.99	4259					
M4500DT &															15.19	12.22	11.90	12.02	10.77
M4500 16 Speed	1348	Die.	7800	2635	6	3.23x3.23	158.5	2600	49.72	540	44.49	42.50	6.16	4812					
M4950DT &															14.70	11.21	11.49	11.15	9.26
M4950 12 Speed	1496	Die.	8195	2395	6	3.35x3.23	170	2600	49.57	540	45.47	41.43	4.68	5292	17.28	13.58	13.72	13.34	11.67
M5030DT	1595	Die.	8120	2985	6	3.35x3.23	170	2600	49.77	540	48.94	42.00	4.90	4592					
M5500DT and																			
M5500 16 Speed	1369	Die.	8710	3210	3	4.134x4.528	182	2400	53.99	540	49.18	46.96	5.51	6287	16.22	12.44	13.05	12.77	11.05

M5950DT & M5950 12 Speed	1497	Die.	9220	3100	3	4.29x4.53	196	2400	58.00	540	52.81	49.29	5.09	5749	17.08	13.44	13.64	13.53	11.83
M6030DT	1596	Die.	8970	3590	3	4.29x4.53	196	2400	57.74	540	53.57	48.11	5.54	5330	16.96	13.32	13.28	13.32	11.68
M6950DT & M6950 12 Speed	1498	Die.	9575	2530	4	4.13x4.53	243	2400	66.44	540	63.96	56.74	5.02	6517	16.98	13.26	13.72	13.28	11.33
M7030DT	1597	Die.	9405	3205	4	4.13x4.53	243	2400	68.87	540	64.38	58.49	5.23	5896	17.43	13.68	14.03	13.80	11.97
M7500DT & M7500 16 Speed	1349	Die.	9510	3530	4	4.13x4.53	243	2400	72.34	540	66.54	61.29	6.65	6327	17.83	14.15	13.93	14.20	12.40
M7950DT & M7950 12 Speed	1499	Die.	10305	3205	4	4.29x4.53	262	2400	75.44	540	69.32	65.24	5.26	7244	17.14	13.57	13.88	13.82	11.93
M8030DT	1598	Die.	9970	3640	4	4.29x4.53	262	2400	76.91	540	70.47	64.37	6.97	6503	17.23	13.71	13.70	13.54	11.95
M8950DT	1557	Die.	12270	2540	4	4.29x4.53	262	2400	85.63	1005	85.63	71.13	7.53	7974	16.21	12.91	12.96	12.37	10.36
Lamborghini																			
1056DT	1269	Die.	12050	1700	6	3.86x4.72	331	2220	92.13	1000	89.98	79.51	6.86	9135	15.16	13.02	12.45	12.74	10.93
Leyland																			
472 & 272 9 Speed	1341	Die.	11990	4580	4	3.858x4.921	230	2200	63.52	540	58.50	53.27	5.91	7224	14.97	12.28	11.32	11.67	10.48
482 & 282 9 Speed	1340	Die.	12000	4590	4	3.858x4.921	230	2200	74.28	540	70.86	61.19	5.86	7032	17.58	12.63	12.70	12.10	10.09
Long																			
360	1298	Die.	6410	1930	3	3.74x4.33	143	2400	36.16	540	31.06	31.91	5.20	4808	14.41	11.97	12.45	12.13	10.48
510	1415	Die.	8210	3925	3	4.02x4.33	164.5	2400	49.15	540	46.91	43.27	5.14	6040	15.74	13.48	13.15	13.52	12.24
510DTC	1416	Die.	9100	3835	3	4.02x4.33	164.5	2400	49.35	540	46.41	41.37	4.63	5635	16.47	13.72	13.68	13.30	11.69
610	1417	Die.	8985	4290	4	4.02x4.33	219	2400	64.33	540	60.57	57.48	5.37	7018	15.93	13.46	13.58	13.51	11.92
Massey-Ferguson																			
MF154-4	1411	Die.	6920	1615	3	3.60x5.00	152	2250	42.52	540	40.38	35.40	4.52	4144	17.26	13.41	13.79	13.00	11.42
MF184-4 12 Speed	1392	Die.	7775	1395	4	3.875x5.0	236	2200	62.45	540	59.56	52.38	7.13	5500	16.41	12.37	12.61	12.11	10.69
MF205 6 Speed	1363	Die.	2840	935	2	3.46x3.46	65.2	2400	16.56	540	16.34	13.45	4.39	1995	12.97	9.62	9.98	9.65	8.03
MF205-4 6 Speed	1364	Die.	3120	905	2	3.46x3.46	65.2	2400	16.40	540	16.18	13.57	4.86	2131	12.83	9.69	10.04	9.57	8.02
MF210 12 Speed	1365	Die.	3550	1090	2	3.62x3.74	77.1	2500	21.96	540	21.23	18.08	5.81	2159	13.61	11.04	10.84	10.53	9.36
MF210-4 12 Speed	1366	Die.	3765	1030	2	3.62x3.74	77.1	2500	21.77	540	21.02	17.60	6.91	2158	13.18	10.75	9.97	10.44	8.61
MF220 12 Speed	1367	Die.	4220	1455	2	3.82x3.94	90.3	2500	26.37	540	25.52	23.95	4.34	3287	13.36	11.07	11.22	11.60	10.17
MF220-4 12 Speed	1368	Die.	4487	1307	2	3.82x3.94	90.3	2500	26.48	540	26.06	22.91	3.84	3496	14.09	11.56	11.09	11.55	10.02
MF240 8 Speed	1519	Die.	4985	770	3	3.60x5.00	152	2000	34.77	540	31.89	29.39	5.30	3824	16.10	13.18	13.72	13.35	11.59
MF245	1251	Die.	6150	2100	3	3.60x5.00	152	2250	42.90	540	36.50	36.75	5.92	4279	16.25	12.72	12.43	12.79	11.13
MF245	1252	Gas.	6020	2120	4	3.375x4.062	145	2250	41.09	540	34.15	35.50	5.90	4298	11.74	9.07	9.50	9.07	7.88
MF250 8 Speed	1520	Die.	5760	1175	3	3.60x5.00	152	2250	40.86	540	36.93	35.07	5.81	4297	15.80	12.38	12.92	12.50	10.72
MF254 12 Speed	1478	Die.	7275	1790	3	3.60x5.00	152	2250	43.36	540	40.71	35.14	5.82	3844	16.58	13.43	12.84	12.51	10.62
MF255 12-Speed	1250	Die.	7310	895	4	3.875x5.00	236	2000	52.68	540	48.37	44.75	7.89	5591	16.92	12.70	13.34	12.82	11.03
MF270 8 Speed	1521	Die.	8195	1295	4	3.875x5.00	236	2000	55.85	540	52.75	47.08	4.96	5896	16.79	12.99	13.44	13.10	11.22
MF274 12 Speed	1479	Die.	8190	2205	4	3.875x5.00	236	2200	55.39	540	54.26	46.76	6.56	4719	17.25	12.80	13.76	12.66	10.59
MF290 12 Speed	1522	Die.	9070	3130	4	3.975x5.00	248	2200	65.92	540	59.37	56.36	6.44	7654	16.58	12.75	13.24	12.76	10.98
MF294 12 Speed	1480	Die.	8645	1925	4	3.975x5.00	248	2100	67.39	540	64.94	56.28	5.77	5665	17.58	14.53	14.68	13.95	12.54
MF296 8 Speed	1523	Die.	11040	3070	4	4.50x5.00	318	2000	79.54	1000	73.66	69.74	5.14	8712	16.31	12.88	13.47	13.14	11.55
MF298 12-Speed	1524	Die.	10950	2935	4	4.50x5.00	318	2000	79.26	1000	74.25	67.85	7.73	8663	15.72	11.93	12.40	12.39	10.79
MF670 & 270 12-Speed	1538	Die.	9200	480	4	3.875x5.00	236	2000	55.62	1000	51.44	46.05	4.87	6382	16.39	12.37	12.93	12.10	10.25
MF690 12-Speed	1539	Die.	10295	2275	4	3.975x5.00	248	2200	65.68	540	62.25	54.78	4.77	7650	15.51	11.96	12.01	11.79	9.82
MF698 12-Speed	1540	Die.	12125	2185	4	4.50x5.00	318	2000	78.83	540	74.41	68.38	4.56	8707	15.91	11.91	12.55	12.24	10.59
MF699 12-Speed	1541	Die.	12935	2610	6	3.875x5.000	354	2200	85.79	540	78.00	71.71	4.69	8712	16.96	12.87	13.51	12.66	10.64
MF1020	1552	Die.	2930	700	3	2.953x3.347	68.7	2350	17.08	540	16.24	14.59	5.01	1771	12.53	10.51	10.36	10.44	9.39
MF1030	1553	Die.	3915	925	3	3.228x3.543	87	2500	23.35	540	22.80	18.65	5.70	2277	12.97	10.31	10.04	9.82	8.30
MF1040	1554	Die.	4715	915	3	3.622x3.937	121.7	2500	27.73	540	25.80	22.57	5.52	2795	12.98	10.01	10.07	9.53	7.84
MF2640 16-Speed	1481	Die.	16380	3945	6	3.875x5.00	354	2400	90.95	1000	87.60	74.83	6.58	10623	15.81	11.67	12.15	11.46	9.70
MF2675 8-Speed	1321	Die.	14280	1930	6	3.875x5.00	354	2500	100.84	1000	95.00	86.18	5.91	10226	15.00	11.14	11.48	11.57	10.01
MF2675 24-Speed	1309	Die.	14495	2065	6	3.875x5.00	354	2500	103.29	1000	96.67	87.47	5.09	9674	15.43	11.56	11.76	11.49	9.95
MF2705 8-Speed	1322	Die.	16800	4295	6	3.875x5.00	354	2500	121.11	1000	114.44	101.47	6.17	12588	16.84	11.22	12.54	11.30	9.45
MF2705 24-Speed	1310	Die.	17490	4895	6	3.875x5.00	354	2500	122.20	1000	115.85	104.23	5.30	13085	16.65	11.22	12.74	11.27	9.23
MF2745	1311	Die.	19490	4300	8	4.25x4.75	539	2600	143.40	1000	132.21	125.17	5.51	15386	15.40	10.62	11.96	11.13	9.39
MF2775	1278	Die.	20440	4210	8	4.63x4.75	640	2600	165.95	1000	149.86	143.70	5.72	17407	16.05	11.50	12.57	11.52	9.85
MF2775 8 Speed	1389	Die.	20170	4365	8	4.63x4.75	640	2600	162.09	1000	146.87	139.68	5.73	16766	15.78	11.19	12.45	11.68	9.56
MF2805 24 Speed	1258	Die.	21170	5540	8	4.63x4.75	640	2500	194.62	1000	181.77	160.72	7.10	17369	16.29	11.33	12.21	11.14	9.27

(continued)

Ten-Year Summary of Test Reports, 1977-1986

						ENGINE									FUEL CONSUMPTION (HP Hours Per Gallon) at:-				
MAKE AND MODEL OF TRACTOR	Test No.	Fuel Used	Weight With Ballast	Lbs. Ballest Carried	No. of Cyl-inders	Bore and Stroke	Dis-place-ment Cu. in.	Rated RPM	Max. PTO HP at Rated Engine RPM	Std. PTO RPM	Max. PTO HP Std. PTO RPM	Max. Draw-bar HP	MPH at Max. Dwbr. HP	Max. Lbs. Pull	Max. PTO HP at Std. PTO RPM	PTO Average at Varying Power	—Varying Drawbar Power— Max. Avail-able Power	75% of Pull Max. Power	50% of Pull at Max. Power
Massey-Ferguson (cont.)															16.59	10.97	12.41	11.43	9.58
MF2805 8-Speed	1399	Die.	21430	5395	8	4.63x4.75	640	2500	190.81	1000	186.29	164.58	5.41	17647	15.53	11.40	11.55	10.90	9.19
MF3505 16-Speed	1511	Die.	13195	260	6	3.875x5.00	354	2400	91.50	1000	87.47	74.79	6.54	8344	16.67	11.65	12.65	11.53	9.31
MF3525 16-Speed	1512	Die.	14645	1545	6	3.875x5.00	354	2400	108.01	1000	103.67	91.22	6.45	9322	17.01	12.11	12.86	11.47	9.64
MF3545 16-Speed	1513	Die.	17235	3935	6	3.875x5.00	354	2400	126.72	1000	122.15	105.16	6.82	10563	15.10	10.12	12.13	10.73	8.39
MF4800 12 & 18-Speed	1342	Die.	30520	0	8	5.5x4.75	903	2600	179.31	1000	172.88	159.08	4.82	25294	15.57	10.77	12.41	11.25	9.32
MF4840 12 & 18-Speed	1343	Die.	30920	0	8	5.5x4.75	903	2600	210.67	1000	210.61	186.36	4.84	28191	16.80	11.51	13.50	11.98	9.58
MF4680 12 & 18-Speed	1344	Die.	32450	1360	8	5.5x4.75	903	2600	272.81	1000	267.38	244.57	6.54	29272	16.80	11.95	13.26	11.82	9.87
MF4900 18-Speed	1391	Die.	33940	2975	8	5.5x4.75	903	2600	320.55	1000	323.88	278.78	6.53	30090					
Same																			
Tiger 100	1268	Die.	11620	2500	5	4.13x4.72	317	2200	90.45	1000	89.42	78.84	6.35	9116	15.48	13.22	12.41	13.08	11.26
Satoh																			
S750DD &																			
S750D 9-Speed	1347	Die.	5550	1620	3	3.386x4.016	108.4	2500	33.45	540	28.11	28.99	5.93	4295	11.92	10.89	9.86	11.18	9.58
Steiger																			
Wildcat III ST-210																			
& RC-210	1237	Die.	22260	0	8	4.500x5.000	636	2800	---	---	---	171.44	5.84	21052	---	---	12.71	12.58	10.82
Bearcat 1000	1592	Die.	28575	0	6	4.75x6.00	638	2100	218.00	1000	218.00	195.49	4.45	28566	16.61	13.41	14.68	13.57	11.60
Cougar 1000	1593	Die.	31270	2820	6	4.75x6.00	638	2100	259.96	1000	259.96	230.18	6.59	30981	---	---	13.24	12.60	11.04
Bearcat III ST-220	1246	Die.	29380	0	6	5.500x6.000	855	2100	---	---	---	175.58	4.84	26936	---	---	13.99	13.54	11.65
Bearcat III ST-225(1)	1414	Die.	30005	465	6	4.75x6.00	638	2100	---	---	---	197.69	5.47	28805	---	---	12.02	10.80	9.29
Bearcat III PT225	1272	Die.	30825	0	6	4.75x6.00	638	2200	(3)	---	---	180.86	6.33	29749	---	---	16.43	15.28	13.12
Bearcat IV KM-225	1542	Die.	33820	5420	6	4.921x5.354	611	2100	---	---	---	203.31	4.82	31556	17.27	14.40	15.17	14.31	12.53
Cougar CR-1225	1577	Die.	29190	0	6	4.75x6.00	638	2100	208.61	999	208.61	184.83	5.16	29570	16.46	13.29	14.40	13.46	11.44
Cougar CR-1280	1578	Die.	29600	0	6	4.75x6.00	638	2100	258.15	999	258.15	231.19	5.19	28708	17.19	14.18	15.18	14.30	12.36
Cougar III ST-250	1239	Die.	29800	0	6	4.75x6.00	638	2200	---	---	---	210.35	6.38	26612	---	---	12.74	11.90	10.36
Cougar III ST-250(2)	1452	Die.	29965	0	6	4.75x6.00	638	2100	---	---	---	215.98	6.11	29539	---	---	15.16	14.40	12.76
Cougar III ST-251	1233	Die.	30840	0	6	5.500x6.000	855	2100	---	---	---	205.82	7.98	26880	---	---	14.74	13.69	11.60
Cougar III PT270	1273	Die.	32210	1495	6	4.75x6.00	638	2200	(3)	---	---	219.39	6.29	30122	---	---	12.73	11.81	10.23
Cougar III ST-270	1238	Die.	29930	0	6	4.75x6.00	638	2200	---	---	---	228.96	6.38	25371	---	---	13.32	12.62	10.96
Cougar III PTA-280	1402	Die.	33675	2895	6	5.50x6.00	855	2100	---	---	---	224.92	5.54	32625	---	---	13.74	12.54	10.44
Cougar III PTA-280	1413	Die.	33150	2370	6	5.40x6.50	893	2100	---	---	---	236.55	7.07	32085	---	---	14.24	13.14	11.19
Cougar III ST-280	1401	Die.	33105	2625	6	5.50x6.00	855	2100	---	---	---	236.82	5.37	31517	---	---	14.55	13.20	11.05
Cougar III ST-280	1412	Die.	33345	2705	6	5.40x6.50	893	2100	---	---	---	246.13	6.28	32099	---	---	14.85	13.76	11.69
Panther III ST-310	1235	Die.	30850	0	6	5.50x6.00	855	2100	---	---	---	261.78	7.90	26757	---	---	13.95	13.09	11.02
Panther III ST-325	1236	Die.	31080	0	6	5.40x6.50	893	2100	---	---	---	281.94	7.93	28189	---	---	14.82	14.19	12.64
Panther III PTA-325	1355	Die.	33960	3140	6	5.40x6.50	893	2100	---	---	---	274.88	5.34	31876	---	---	14.26	13.45	11.55
Panther III PT350	1274	Die.	34000	2855	8	5.4x4.75	903	2600	(3)	---	---	305.48	6.51	32276	---	---	14.91	13.75	11.32
Panther IV KM-325	1543	Die.	33715	3955	6	5.50x6.00	855	2100	---	---	---	299.30	6.09	32700	---	---	16.04	14.79	13.00
Panther IV CM-360	1544	Die.	33740	3815	6	5.40x6.50	893	2100	---	---	---	334.37	6.03	32328	---	---	15.96	15.15	13.29
Panther IV SM-325	1550	Die.	33930	5030	6	4.921x5.906	674	2100	---	---	---	278.09	6.78	33651	---	---	17.12	15.98	14.22
Panther CP-1325																			
12-Speed	1453	Die.	35870	410	6	5.40x6.50	893	2100	299.10	1002	299.10	266.97	6.95	33802	16.55	13.59	14.71	13.86	11.95
Panther CP-1360																			
12-Speed	1455	Die.	39120	3860	6	5.40x6.50	893	2100	334.33	1002	334.33	294.07	6.89	36123	16.75	13.78	14.60	13.81	11.85
Panther CP-1400																			
12-Speed	1464	Die.	43615	7165	6	5.40x6.50	893	2100	---	---	---	334.94	8.17	40272	---	---	14.92	14.12	12.07
Panther KP-1325																			
12-Speed	1465	Die.	35815	605	6	65.50x6.00	855	2100	301.21	1002	301.21	267.87	6.93	34267	17.38	13.97	15.58	14.15	11.84

Panther KP-1360																			
12-Speed	1456	Die	39570	4090	6	5.50x6.00	855	2100	326.12	1002	326.12	291.14	6.92	36771	17.39	14.15	15.45	14.27	12.15
Panther KP-1400																			
12-Speed	1463	Die.	43175	6640	6	5.50x6.00	855	2100	...	...	...	333.18	4.82	40803	...	...	15.87	14.54	12.10
Tiger III ST450	1282	Die.	47370	4645	6	6.25x6.25	1150	2100	...	...	...	372.61	6.56	42610	...	...	14.18	12.70	10.56

(1) SN. 109-00328 and higher. (2) SN. 104-00331 and higher. (3) Equipped with hydrostatic PTO 105HP at 1000 RPM.

Valmet																			
980 4x4	1599	Die.	13265	5000	4	4.01x4.72	239	2300	68.01	540	80.55	78.04	6.71	10722	18.23	13.14	14.35	13.19	11.26
148 4x4	1600	Die.	16830	5920	6	4.01x4.72	359	2300	126.89	1000	127.11	110.09	4.94	13574	16.92	13.63	14.29	13.29	11.71
Versatile																			
256 Hydrostatic	1518	Die.	10460	1310	4	4.02x4.72	239	2500	84.36	540	85.08	62.81	5.49	9134	16.45	12.67	11.82	11.07	9.52
276 Hydrostatic	1565	Die.	10510	1310	4	4.02x4.72	239	2500	100.22	540	102.14	70.91	5.61	7892	16.50	12.86	11.37	10.25	8.63
555	1331	Die.	25980	6330	8	4.625x4.125	555	2850	182.25	1000	184.35	154.20	4.56	23533	16.33	11.15	12.96	11.17	8.83
835 12	1356	Die.	28000	3720	6	5.50x6.00	855	2100	198.23	1009	198.23	179.07	6.13	26380	15.13	11.36	13.16	11.87	9.70
835 Series 3 12-Speed																			
SN. 835-83-036769																			
& higher	1482	Die.	27980	3595	6	5.50x6.00	855	2100	200.30	1009	200.30	181.14	5.34	25687	15.82	11.86	14.45	12.74	10.45
836 Manual	1566	Die.	25960	1300	6	4.921x5.354	611	2100	192.54	1008	192.54	170.56	4.83	24123	17.71	13.80	15.59	14.11	11.99
836 Powershift	1567	Die.	25995	1535	6	4.921x5.354	611	2100	181.04	997	181.04	161.45	6.77	24723	16.65	12.56	14.80	13.34	11.24
856 Powershift	1568	Die.	28000	2920	6	4.921x5.354	611	2100	209.28	997	209.28	185.04	5.88	26479	17.24	13.22	15.35	13.59	11.40
875	1279	Die.	29500	4980	6	5.50x6.00	855	2100	248.07	1008	248.07	228.35	9.12	24457	15.45	11.76	13.60	12.28	10.40
875	1332	Die.	29480	4160	6	5.50x6.00	855	2100	247.16	1008	247.16	221.66	4.86	26795	16.06	12.02	14.35	12.53	10.34
875 Series 3 12-Speed																			
SN. 875-83-057906																			
& higher	1483	Die.	29500	3870	6	5.50x6.00	855	2100	252.67	1008	252.67	227.48	5.65	26725	16.82	13.06	15.25	13.73	11.82
876 Manual	1569	Die.	29500	4540	6	4.921x5.354	611	2100	...	...	...	233.92	6.53	27703	...	...	16.85	16.68	13.65
895 12-Speed	1335	Die.	32500	7880	6	5.50x6.00	855	2100	...	...	...	261.63	6.45	29402	...	...	15.15	13.72	11.57
936 Manual	1570	Die.	32385	5260	6	5.50x6.00	855	2100	...	...	...	260.45	6.78	29495	...	...	15.47	14.04	12.09
1150 8-Speed	1462	Die.	46500	11360	6	6.25x6.25	1150	2100	...	...	...	400.29	5.92	43219	...	...	15.84	14.64	12.35
White																			
2-30 8-Speed	1373	Die.	3853	848	3	3.386x3.386	91.4	2600	28.33	540	24.50	25.81	8.35	2816	12.03	10.27	10.77	11.42	9.61
2-35 8-Speed	1374	Die.	3970	800	3	3.386x4.02	108.4	2400	32.84	540	30.94	30.37	8.00	2978	12.68	10.86	11.23	11.73	10.35
2-45 20-Speed	1395	Die.	6630	660	4	3.858x3.62	169.3	2250	43.73	540	36.62	37.32	3.97	4455	12.70	11.25	10.96	11.00	9.66
2-50 Field Boss	1231	Die.	6860	2325	3	3.940x4.330	158	2500	47.02	540	43.94	41.88	4.80	5640	15.80	13.03	13.26	13.49	11.97
2-55 16-Speed	1466	Die.	7055	860	4	4.02x3.94	199.4	2200	53.32	540	45.74	48.49	4.88	5037	14.89	12.38	13.35	13.21	11.39
2-60 Field Boss	1232	Die.	8990	3830	4	3.940x4.330	211	2400	63.22	540	54.35	54.78	5.07	7352	17.63	13.82	14.40	13.87	11.93
2-62 20-Speed	1396	Die.	6875	635	4	4.016x4.33	219	2200	61.46	540	54.25	51.63	6.05	4695	16.31	13.85	13.76	13.49	12.08
2-65 16-Speed	1467	Die.	7110	790	4	4.02x4.65	235	2200	62.50	540	55.40	56.67	6.51	4287	16.19	12.91	13.94	13.20	11.29
2-75 16-Speed	1486	Die.	9625	1705	6	4.016x4.33	329	2200	75.39	1007	75.64	65.05	6.04	6487	15.86	12.02	13.01	12.21	10.48
2-88 18-Speed	1487	Die.	13615	0	6	3.875x5.00	354	2200	86.78	1007	86.78	74.67	6.51	9486	15.71	12.69	13.62	12.74	10.79
2-110 18-Speed	1468	Die.	13955	0	6	3.875x5.00	354	2200	110.52	1000	110.52	94.90	6.40	9500	16.77	13.27	14.19	13.08	10.84
2-135	1275	Die.	16360	2225	6	4.56x4.87	478	2200	137.64	1000	138.03	117.67	8.93	11907	14.91	11.38	12.31	11.42	9.73
2-155	1276	Die.	16650	0	6	4.56x4.87	478	2200	157.73	1000	162.37	139.68	9.04	14512	15.38	11.91	12.69	11.53	9.97
4-175 Field Boss	1375	Die.	20420	0	8	4.50x5.00	636	2600	151.69	1000	151.29	133.72	6.39	19905	15.50	11.70	12.96	11.98	10.01
2-180	1287	Die.	18280	0	8	4.50x5.00	636	2800	181.89	1000	181.89	163.64	6.50	15499	14.38	11.66	12.85	12.48	10.56
4-210 Field Boss	1318	Die.	23735	0	8	4.50x5.00	636	2800	182.44	1000	182.44	162.25	5.89	22934	14.26	11.53	12.34	12.10	10.25
4-225	1558	Die.	24140	0	8	4.50x5.00	636	2600	195.65	1002	195.65	170.57	5.47	22865	15.60	12.06	13.64	12.42	10.44
4-270	1559	Die.	30650	0	6	4.75x6.00	638	2100	239.25	1000	242.30	211.70	6.60	27180	16.69	13.60	14.53	13.53	11.90
Yanmar																			
YM226D	1442	Die.	3380	1080	3	2.95x3.35	68.7	2600	19.42	540	17.87	16.14	4.78	2073	15.07	11.67	11.92	10.93	9.26
YM276D	1443	Die.	4110	1405	3	3.31x3.35	86.2	2600	23.00	540	22.82	18.93	5.78	2412	14.35	11.06	11.08	10.57	8.90
YM336D	1444	Die.	5020	1615	3	3.31x3.54	91.3	2600	26.88	540	25.63	23.00	6.28	3086	14.27	11.32	11.39	10.66	9.64
Zetor																			
5245/5211	1571	Die.	7295	385	3	4.02x4.33	164.6	2200	42.51	540	40.10	37.83	5.70	4558	16.56	13.17	14.59	13.83	12.10
7245/7211	1572	Die.	8565	725	4	4.02x4.33	219	2200	58.28	540	54.91	50.77	5.75	4788	16.82	13.51	14.36	13.90	12.33
6245 (6211)	1601	Die.	8535	855	4	3.94x4.33	211	2200	53.09	540	50.23	47.43	5.57	6332	16.06	13.04	13.84	13.34	11.50
7745 (7211)	1602	Die.	10360	2455	4	4.02x4.72	239	2200	65.74	540	62.17	57.56	6.63	7484	17.01	13.94	14.30	13.72	12.05

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Implement &Tractor

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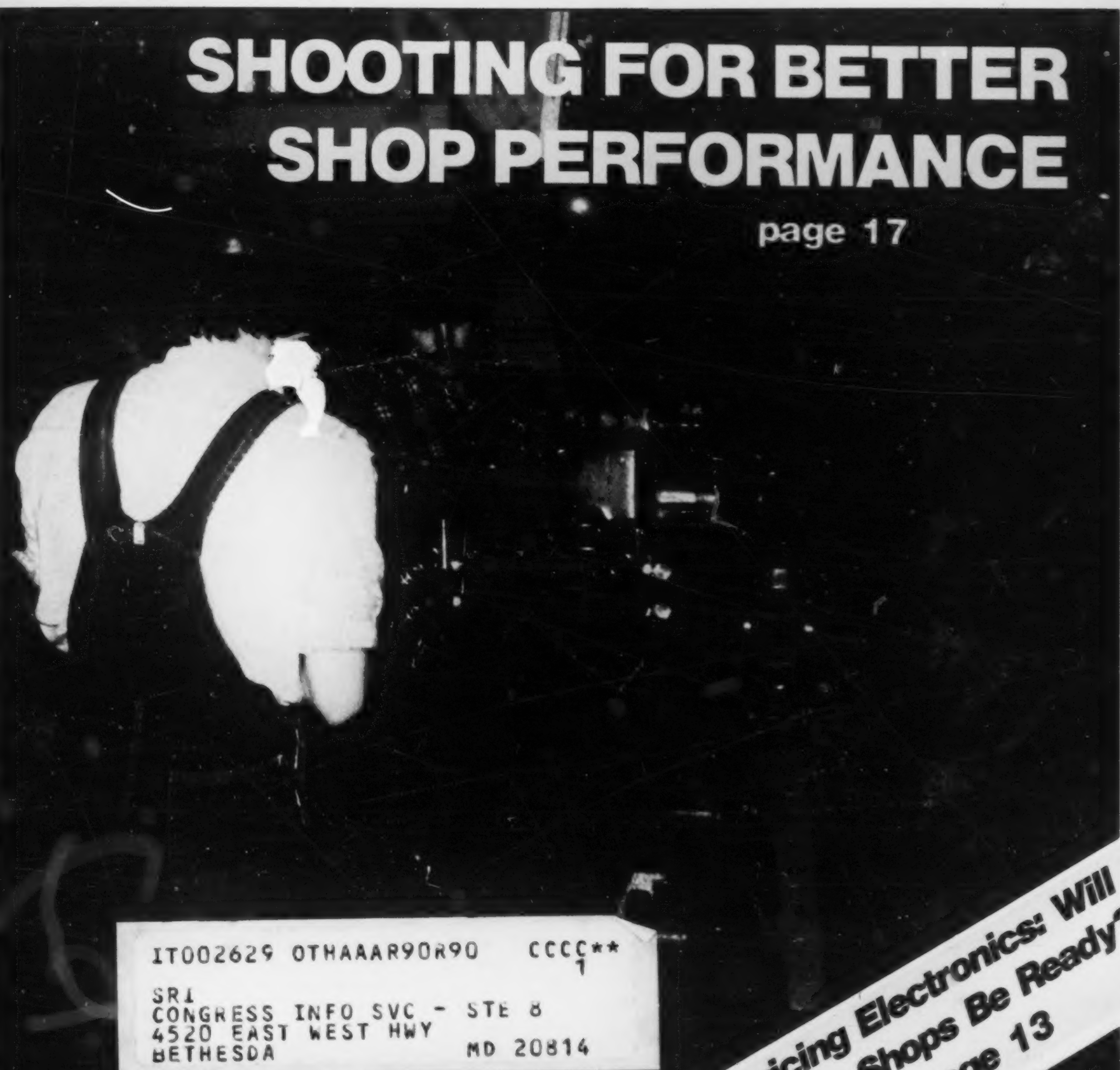
Let's Make It Harder for Thieves page 25



SHOOTING FOR BETTER SHOP PERFORMANCE

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Servicing Electronics: Will Dealer Shops Be Ready?

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On Our Cover

Foreman Ron Eastwood (left) and technician Brian Cornett work at reassembling the rear end of an IH 1086 in the shop of Knecht Equipment, Louisburg, Kan. I&T asked a group of dealers to cite recent moves they had made to improve productivity and profitability.

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Features

13: **Industry service** executives say problem areas are going to improve. Technicians are getting better but need more training. One hitch: Low sales volumes have kept dealers from investing in high-level diagnostic equipment.

17: **Making the shop** more productive and profitable is not always a massive restructuring. Sometimes dealers can make things better with some unspectacular moves. One essential is the dealer's attention and concern.

20: **Tractor tire update:** Low-vibration types surge ahead. This and other trends discussed in this feature by Frank Buckingham.

25: **A survey of dealers** revealed many ways to prevent or make it difficult for equipment thieves to walk or drive off with valuable merchandise. Who's the loss prevention manager at your dealership?

26: **On most stolen goods,** thieves can expect to get about one-tenth of the item's market value, but it's different with farm equipment, for which thieves usually get 50 percent of market value.

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Retail Sales Maintain Strong Pace in February

Retail sales of tractors and several types of farm equipment continued to show strength in February, according to the flash report of the Farm & Industrial Equipment Institute. Every category was up, with the most significant increase shown among tractors of from 40 to 99 horsepower. Dealers sold 2,197 of them in February, a 67 percent improvement on the same month in 1987.

	Unit Retail Sales					
	February			January-February		
Equipment	**1988**	**1987**	**% Change**	**1988**	**1987**	**% Change**
Farm Wheel Tractors:						
2-Wheel Drive						
Under 40 HP	2,572	2,478	3.8	5,604	5,430	3.2
40 & Under 100 HP	2,197	1,317	66.8	4,574	3,385	35.1
100 & Under 140 HP	244	116	110.3	754	469	60.8
140 HP & Over	581	206	182.0	1,828	854	114.1
Total 2-Wheel Drive	5,594	4,117	35.9	12,760	10,138	25.9
4-Wheel Drive						
Under 200 HP	45	35	28.6	111	66	68.2
200 HP & Over	100	55	81.8	214	145	47.6
Total 4-Wheel Drive	145	90	61.1	325	211	54.0
Total Farm Wheel Tractors	5,739	4,207	36.4	13,085	10,349	26.4
Combines (Self-Propelled)	220	72	205.6	822	238	245.4
Baiers (Bales under 200 lbs)	166	101	64.4	354	335	5.7
Forage Harvesters (Shear Bar Type)	88	48	83.3	151	133	13.5
Mower Conditioners	367	259	41.7	656	653	.5

White to Build Tractors for Deutz-Allis Corp.

Deutz-Allis has signed a letter of intent with Allied Products Corp. under which Allied's White-New Idea Div. will produce a line of tractors under Deutz-Allis specifications.

Under the four-year agreement, White-New Idea will make tractors of over 150 horsepower at its Coldwater, Ohio, facility. The arrangement is subject to final approval June 30 by both companies' boards.

The new tractor line will incorporate Deutz air-cooled engines, Deutz-Allis styling and White-New Idea drivelines, according to a statement by both firms. Engineering on the tractor line begins immediately, with production expected to start in the second quarter of 1989.

Briefly...

Kubota Tractor Corp., Compton, Calif., has named Ron H. Lytle to the post of senior vice president of sales and marketing. He had been vice president of sales.

Massey Combines Corp. Passes into Receivership

Massey Combines Corp. of Brantford, Ont., and Urbandale, Iowa, has halted operations after defaulting on its debt agreements. Peat, Marwick Ltd. of Toronto has been appointed as receiver of the company by the Ontario Supreme Court.

At press time, small staffs retained by the receiver were at work in both locations to attend to current activities such as parts supply and warranty administration. Some workers were expected to be called back to the Brantford plant to produce some replacement parts and complete some work in progress.

Massey Combines Corp. was formed in 1985 as a spinoff from Varity Corp., which owns 45 percent of its shares and has recently written the shares' value down to zero. Other owners are the Ontario and Canadian governments and some U.S. and Canadian banks. MCC owes 38 lenders a total of $290 million Canadian (or $231 million U.S.) and has assets estimated at about $200 million.

Historically, the Massey combine line has had a North American market share of 15 to 16 percent, with its greatest strength in Canada. In 1987, Canadian combine sales fell drastically for the entire industry.

Massey Combines Corp. was created with considerable debt and with responsibility for providing some cash for the underfunded pensions of approximately 4,000 retirees. The company had developed some innovative approaches to marketing used combines in which it had a position, but these efforts were insufficient to keep the company operative.

Gehl Buys Line of Rough-Terrain Forklifts

Gehl Co., West Bend, Wis., has acquired "certain product assets" of TCI Power Products, Yankton, S.D.—a line of rough-terrain forklifts and attachments, and a grader. TCI is a limited partnership.

According to Bernard Neilsen, president of Gehl, this is the "most aggressive" of Gehl's major acquisitions since 1985 and the first purely industrial one.

The 60,000-sq.-ft. plant at Yankton will continue producing the line, to be called Gehl Power Products. Other industrial products marketed by Gehl include skid-steer loaders and an offshore-built mini-excavator.

Rough-terrain, telescoping-boom forklifts are used in construction to move building materials around construction sites.

Pace of Dealership Closings Is Down

Every six months since 1981, the Farm Equipment Manufacturers Assn. has conducted a "dealers-out-of-business" survey among managers of all U.S. and Canadian farm and industrial equipment dealers associations.

The latest release from FEMA indicates that 123 dealerships closed their doors in the second half of 1987, compared with 177 in the same six-month period of 1986. Close-ups in the full year of 1987 were 303, down from the 483 reported for 1986 and 728 for 1985.

Because not every dealer association provides data every time the survey is taken, it cannot be considered a precise measure of dealer attrition, but it is the only survey available on the subject. Associations which did not participate in the latest study were: Alberta-British Columbia, Carolinas, Deep South, Far West, Mid-South, Pacific Northwest and Virginia.

All participating associations reported 37 new dealerships in the six-month period.

	1983 1st six mos.	1983 2nd six mos.	1984 1st six mos.	1984 2nd six mos.	1985 1st six mos.	1985 2nd six mos.	1986 1st six mos.	1986 2nd six mos.	1987 1st six mos.	1987 2nd six mos.	Total for 84 mos.
Deere	18	21	24	39	57	56	54	33	37	22	414
Case/I.H.	52	28	35	60	158	87	66	36	33	16	832
M.F.	38	16	22	17	24	35	27	15	16	11	365
Deutz/Allis	18	15	22	11	25	38	39	9	15	22	298
Ford	15	16	17	31	32	32	32	14	25	24	295
White	14	15	16	13	18	17	11	13	5	7	185
Others	11	6	5	5	9	9	11	4	7	6	97
Shortlines	14	11	22	21	30	21	35	36	20	11	285
Unidentified	8	9	14	5	10	70	31	17	22	4	256
	188	137	177	202	363	365	306	177	180	123	3,027*

*The total figure rises to 3,073 when 46 closeouts in an unspecified period of 1984 are included. The total also includes closed dealerships in 1981 and 1982, not shown in this table.

Hesston's '87: $42 Million Loss on $119 Million Sales

Hesston Corp., Hesston, Kan., reported a loss of $42 million on sales of $119.3 million for 1987. In the previous year, sales were $120.3 million and losses $42.9 million.

Fourth quarter sales of $15.3 million produced losses of $9.6 million, compared with the fourth-quarter 1986 volume of $31.5 million and losses of $11.7 million.

Mario Chessa, president, said that efforts to reduce dealer inventories in 1987 had brought them to nearly acceptable levels and that sales in 1988 are thus expected to improve. He added that discounting practices of the industry of recent years are expected to continue, but at lower levels, in 1988, and that while Hesston's operational results are thus expected to improve, they will not be profitable.

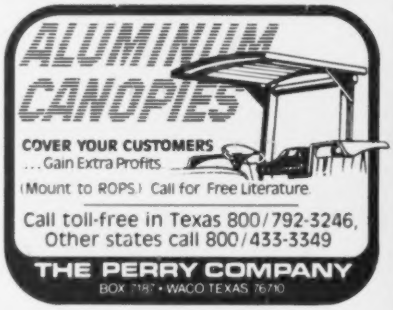
The company's move from Hesston, Kan., to Carol Stream, Ill., is expected to be completed in August 1988.

Briefly...

Stockholders of Speed King Industries, Inc., Dodge City, Kan., and CrustBuster, Inc., Spearville, Kan., have acquired the Hamby Co., Plainview, Texas. Hamby produces tillage tools and rotary mowers.

Farm equipment imports exceeded exports in 1987 by $255 million, according to U.S. Dept. of Commerce data. Exports were up, from $1.47 billion in 1986 to $1.58 billion last year, but imports increased at a faster pace, from $1.63 billion in 1986 to $1.84 billion in 1987.

The Mar-Del-Va Farm & Power Equipment Assn. has changed its name to the Mid-Atlantic Equipment Dealers Assn. Its members are dealers in parts of West Virginia and Virginia, Maryland and Delaware. Its office is located at 2400 Valley Ave., No. 3, Winchester, Va. 22601.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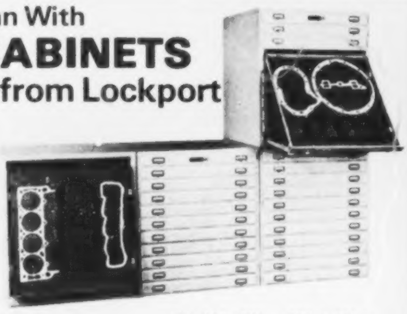
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Tractor Tire Update:

Low-Vibration Types Surge Ahead

Other trends include special versions for powered front-axle tractors, taller and narrower drive tires.

By Frank Buckingham

AFTER IMPROVED tractor cabs blocked out the noise of engines, transmissions and other components, operators began complaining about such discomforts as whole-tractor vibrations. Much of this problem was traced to the impact of tire lugs striking hard soil or paved surfaces during transport.

Tractor and tire engineers tackled the problem and Goodyear offered the first solution...long-bar/short-bar tires which squeezed in more lugs around the tire by placing short bars between longer treads. Other manufacturers soon offered their own low-vibration (LV) tires, some with combinations of long, medium and short lugs. Firestone engineer Bob Strandemo says Firestone bias-ply LV tires have different length treads, but they found they could avoid using long-bar/short-bar tread on *radial* tires by placing equal-length lugs closer together.

Closer lug spacing is the clue to reduced vibrations. Close-spaced lugs keep more rubber touching the ground or road all the time and there's less slap or impact and reduced vibration as tread bars strike the surface. The problem is most severe when the combination of tire diameter, lug shape, spacing and depth and travel speed matches natural vibration frequencies of the tractor engine, transmission, power train, wheelbase, cab and other components.

THIS TIRE, Armstrong's Hi-Traction Lug R-1, is an example of long-bar, short-bar lug design. It comes in 52 sizes with inside diameters ranging from 24 to 42 inches and widths from 11.2 to 30.5 inches.

Close-spaced lugs reduce lateral and vertical tire vibration, smooth out the ride, and reduce "road wear" cupping of tire lugs. Some LV tires show better resistance to buckling and general tread wear. On some tire brands, symmetric positioning of long and short lugs reduces side-to-side sway sometimes encountered on certain tractors. In some tire company tests, LV tires increased tractor drawbar power and field capacity, improved tractive efficiency and reduced fuel consumption per acre compared with conventional tread designs.

One tire engineer said, "When we made field comparisons, long-bar/short-bar tires outperformed tires with traditional tread. We don't have enough tests or data to say they will do it every time. But, in that field, on that soil, with that moisture content and those surface conditions, those implements and

(See Tires, pg. 22)

Tires *(from page 20)*

the drivers we used, long-bar/short-bar tires did better."

Reading between the lines, one sees no clear across-the-board performance advantage for LV tires. In view of some other complaints discussed later, LV tires may outperform tires with traditional tread in some conditions, and fall behind elsewhere.

Regardless of lug configuration, reduced vibration at transport speed is the most commonly mentioned benefit of LV tires. In fact, vibration of some articulated tractors can become severe enough to threaten tractor stability at transport speeds.

Farm Tire Shipments, 1987-1990

	1987	% change from 1986	1988	1989	1990
Rears	825,000	+ 10.00%	825,000	790,000	800,000
(Radials)	68,000	+ 13.30%	75,000	80,000	95,000
Fronts	1,925,000	+ 9.89%	1,925,000	1,850,000	1,875,000

Source: Modern Tires Dealer magazine from estimates provided by Goodyear Tire & Rubber.

But Gary Stratton, tire/traction specialist at Deere's Waterloo Product Engineering Center, says the original design goal was to reduce tractor vibrations on hard soil in the field at speeds of 4 to 7 mph. He adds that lower vibration on the road at 12 to 22 mph was a secondary benefit. Deere engineers are often credited with developing the original long-bar/short-bar, LV tire design.

OEM and Replacement Tires

There's little or no price differential between newer-style LV tires and those with traditional tread. Some manufacturers have replaced all traditional tread designs with LV tread, at least for tires carrying their own brand. Certain replacement tires sold under co-op or house brands, with low price their chief selling feature, are still made with traditional tread.

Stratton says all U.S.-made Deere tractors are sold with LV tires, and about 35 to 40 percent of all Deere tractors are sold with radial tires. From 70 to 75 percent of bigger models such as the Deere 4850 go out with radial tires. Many combines are also being equipped with LV tires for smoother transport.

Ron Treanor, Armstrong's manager of large equipment tire engineering, says the LV tire market is driven by OEM sales, but the replacement market is growing too.

However, Strandemo of Firestone says farmers replacing tires on five to six-year-old tractors are unlikely to specify LV tires, noting, "Those tractors are apt to be pretty loose and noisy, and the operator is so accustomed to the shakes and rattles he doesn't think about benefits of a different tread type."

Deere's Stratton notes, however, that when farmers traded tractors every two or three years they seldom replaced drive tires, and were not too concerned about tread designs. But as tractors are now being kept longer, buyers are becoming more concerned about available options in both OEM and replacement tire designs.

Mud Problems?

Bill Simpson, tractor specialist at Case IH says he tracked one rainstorm from North Dakota to Pennsylvania by telephoned complaints about poor cleaning of new long-bar/short-bar tractor tires. However, Stratton says he's had only two or three secondhand comments about the problem, and no serious gripes. Armstrong's Treanor says closeness of lugs on LV tires can keep sticky mud from cleaning as well, but that the problem depends on lug angle and size and how the tire enters and leaves the track.

Strandemo says they've received complaints, but he believes mud-farmers are a small minority and that Firestone has no documented studies of the problem or plans to change tread designs. Some engineers think it may be a judgment call as to whether soil sticking is worse with LV tires than with conventional tread. They add that if soil is wet enough to stick in the tread it's probably too wet to be in the field anyway and farmers would be better off (less soil compaction) if they waited till soil dries more.

Movement Toward Radials on Farm Tractors

Year	Replacement	OE
1986	7.9%	9.2%
1987	8.7%	11.7%
1988	9.1%	12.5%
1989	10.1%	14.0%
1990	11.8%	17.8%
1991	12.7%	18.5%
1992	14.5%	20.0%

Source: Modern Tire Dealer Magazine from industry estimates.

Some manufacturers are looking at modified LV tread designs with uneven lug surfaces to which less soil can cling, and at better cleaning as lugs exit the track in sticky soil. Treanor says that industry-wide, LV tires "will be *the* tire for general applications, but traditional tread designs may be retained for sticky soils."

Some users also complain that close-spaced lugs on LV tires are unable to grip firm soils in heavy alfalfa sod as well as conventional tread. Traction depends on how well tires grip the surface on which they are operating. Pull on a smooth paved surface depends on total lug contact area, combined length of lug edges gripping the surface and weight on the tire.

On soil, lugs must be able to penetrate through loose material on the surface and grip firm soil, whether it's R-2 rice tires penetrating several inches of mud or R-1 tires working on hard-baked soil, heavy vegetation or mud. If spaces between lugs fill with soil or plant material, tires cannot grip and develop full traction.

Alternatives

Customers not ready or unwilling to replace drive tires may reduce tractor vibration by repositioning dual tires so that lugs on both tires of a pair do not strike the surface at the same time. Minor speed changes and proper tire inflation for the load can also reduce vibration on some tractors.

For lighter loads, taking off extra ballast and reducing tire inflation lets tires cushion tractor bounce and vibration when traveling on hard surfaces. (Removing unnecessary ballast also reduces soil compaction. But ballast adjustment is a task tractor makers need to make easier so that it gets done when it should be.)

Faster travel than rear tires, extra steering forces and the camber angle placed on front tires by Deere's FWA steering system all place special requirements on front tires of FWA tractors. Strandemo says performance requirements for typical drive wheel tires are (1) traction, (2) treadwear and (3) durability.

"But for FWA tires," he said, "we made treadwear number one. The extra stresses imposed on those tires, and the fact that they are out there where the operator can watch them all day long means they must perform 100 percent. Down-sized rear tractor tires are not good enough."

Indeed, smaller tires designed for lower-powered tractors have not been totally successful and tire manufacturers now offer radial tires designed specifically for front-wheel drives.

There's also a trend to taller, narrower drive tires with more and more 18.4 and 20.8-42 tires sold all the time. Primary advantage is reduced rolling resistance. Narrow tires waste less energy packing down loose soil, and cause less soil compaction compared with wider tires.

The longer, narrower footprint and hence total traction of taller tires is equal to or better than that of wider, smaller-diameter tires. Some 46-inch diameter tires are being imported for certain tractors and American tractor and tire manufacturers are testing 46-inch tires in larger sizes. There's even talk of 50-inch rims in the future.

Deere's Stratton says more tire diameter is generally preferable to increased width for more traction and that farmers insist 18.4 is the maximum practical tire width for use in 30 inch crop rows.

He cautions, however, that switching to tires with significantly larger diameter can change hitch geometry and performance.

Briefly...

Micro-Trak Systems, Inc., Mankato, Minn., has acquired the agricultural division of Pioneer Technology, Sunnyvale, Calif. This includes its PC-2 planter computer, which won *I&T*'s Design Award in 1985. Micro-Trak, acquired in 1985 by Taylor Corp., North Mankato, Minn., sells electronic devices to monitor field speed and area, spraying and harvesting.

What They're Saying...

Illiterate in International Affairs

Dr. Robert R. Spitzer, president of the Milwaukee School of Engineering, talked to the Farm & Industrial Equipment Institute recently about some overlooked basics.

Too many free-world citizens, especially Americans, are relatively illiterate in international affairs. Your industry problems are similar to our nation's problems. And I submit that neither you nor our nation have properly identified some of the real problems. We will not be able to resolve our national surface problems of global competition, product quality and reliability, world population growth, unemployment, high welfare, trade deficits and hunger until we identify the root problems. From my perspective, these are related to education, family and leadership weaknesses.

We must help people understand that their economic ignorance on major issues plays into our competitors' hands. Simultaneously, we must resolve the root problems that have been ignored or given only lip service for so long, problems that include strengthening moral and family values....

America needs more qualified engineering graduates if it is to compete with foreign business.

The Japanese emphasize engineering graduates more than we do in the U.S. Six percent of U.S. college graduates are engineers; in Japan, it's over 20 percent. In 1960, Germany, Japan and the U.S. spent about the same percentage of GNP on non-defense R&D. Today, the U.S. stills spends as much on all R&D as a percentage of GNP as Japan, West Germany and Britain, but almost half of ours is defense-related.

Dealer's View of Relationships

Earl Streacker, Findlay, Ohio, Ford dealer, talked at the convention of the Farm & Industrial Equipment Institute about the need for better relationships. He is president of the National Farm & Power Equipment Dealers Assn.

Because inventory is a key to profits, we urge you not to load up your dealers with unneeded equipment that will fade and rust.

We need to improve manufacturer/dealer relationships and keep each other better informed. We have common goals. You do well when we do well.

Dealers do appreciate manufacturers' pre-season interest waivers for customers, floor planning and other sales incentives. We'll also appreciate fewer price increases to pay for them. Our competition is fierce and your prices should be set accordingly to allow us a decent profit margain on the equipment we sell.

Future dealers will be more educated, more market-oriented, market-driven and finance-oriented. They will be knowledgeable about contract law, and will read and understand the fine print in government regulations, sales programs and dealer contracts.

We are all in this together. As our markets return, let us examine our new and changing markets and work together to develop newer and smarter ways of doing business, ways which will lead to improved profitability for everyone.

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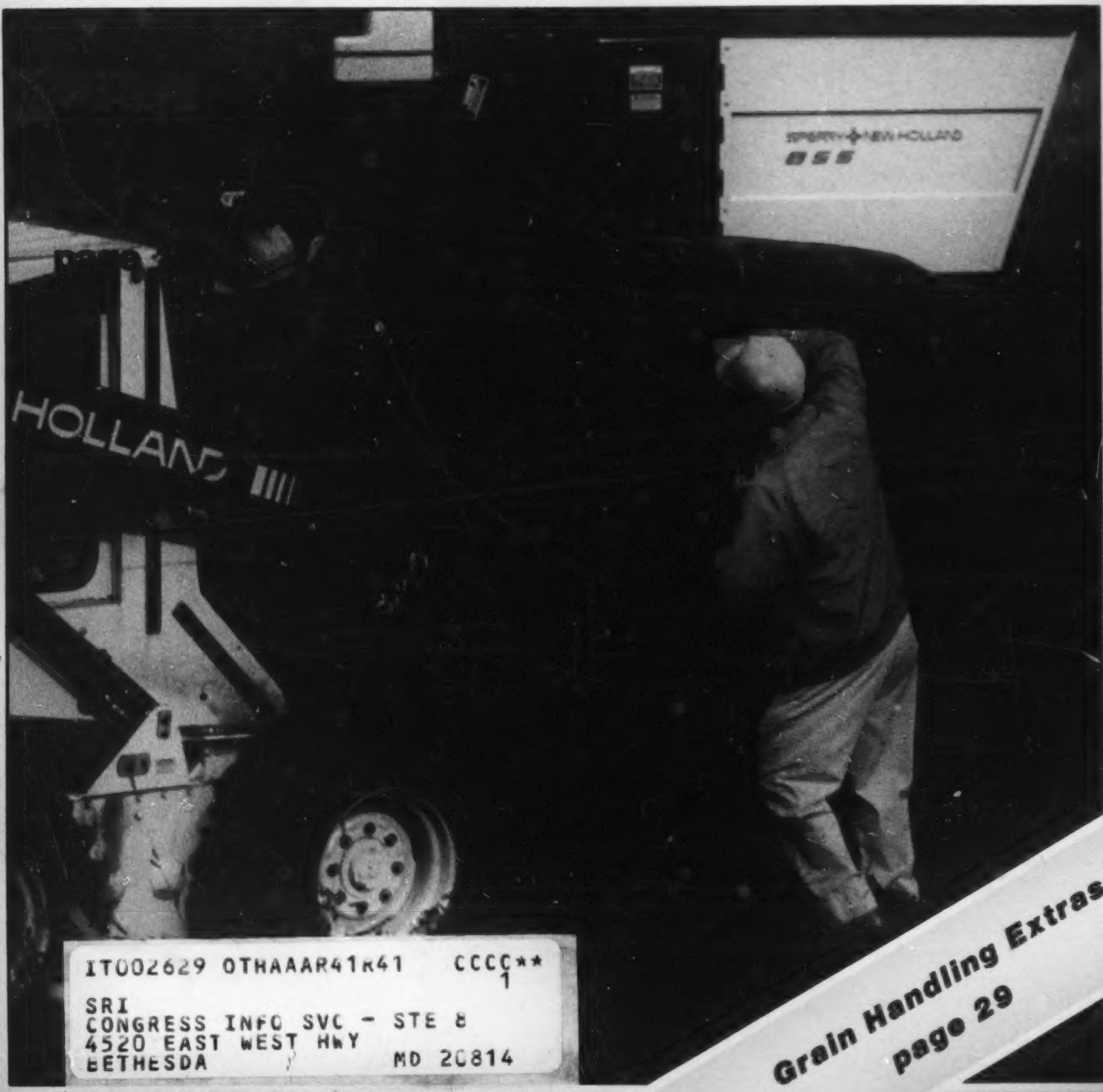

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On Our Cover

On this Pennsylvania farm, they use a skid-steer loader to lift silage bales and put plastic bags on them. It's one of several approaches to balage which have machinery implications.

(Photo by Ford New Holland)

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19: **Selling new values** in forage equipment: Electronics and microprocessors on today's forage equipment deliver real benefits to the users. But prospective buyers need to be told about them.

21: **"Are we suppliers** or are we marketers?" There's an understanding gap between dealers and manufacturers regarding the basics of marketing.

24: **SIMA: Taking** an upturn calmly. The European farm equipment market is enjoying a rebound, but many manufacturers are wary.

29: **Are you selling** grain harvest extras? They could become more important to you if changes in grain quality standards come about.

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Farm Press Publications, Inc.

March Sales Fire Blazes; Does Fuel Shortage Loom?

U.S. retail sales of tractors in the first quarter of 1988 were up 27 percent, with March unit volume up by 28 percent. The big gains were in the high-horsepower, big-ticket ranges; the only sales decline was among Japanese-built, under-40-hp models in March. Some observers speculate that low inventories of some types of equipment may soon produce declines in monthly retail sales.

Unit Retail Sales

	March			January-March		
Equipment	**1988**	**1987**	**% Change**	**1988**	**1987**	**% Change**
Farm Wheel Tractors:						
2-Wheel Drive						
Under 40 HP	4,754	4,913	(3.2)	10,398	10,343	.5
40 & Under 100 HP	3,214	2,129	51.0	7,773	5,514	41.0
100 & Under 140 HP	424	196	116.3	1,174	665	76.5
140 HP & Over	1,118	364	207.1	2,950	1,218	142.2
Total 2-Wheel Drive	**9,510**	**7,602**	**25.1**	**22,295**	**17,740**	**25.7**
4-Wheel Drive						
Under 200 HP	140	51	174.5	252	117	115.4
200 HP & Over	226	59	283.1	439	204	115.2
Total 4-Wheel Drive	**366**	**110**	**232.7**	**691**	**321**	**115.3**
Total Farm Wheel Tractors	**9,876**	**7,712**	**28.1**	**22,986**	**18,061**	**27.3**
Combines (Self-Propelled)	579	76	661.8	1,401	314	346.2
Balers (Bales under 200 lbs)	272	194	40.2	629	529	18.9
Forage Harvesters (Shear Bar Type)	104	92	13.0	254	225	12.9
Mower Conditioners	690	448	54.0	1,344	1,101	22.1

Case IH: Operating Loss of $259 Million

According to the annual report of Tenneco Inc., parent company of Case IH, the farm and construction equipment maker had sales in 1987 of $3.66 billion worldwide and a loss from continuing operations before interest and federal income tax of $259 million.

In the previous year, sales were $3.36 billion and operating losses before interest and tax were $1 million.

Case IH finished 1987 with total assets of $4.56 billion, up $732 million from a year earlier. Capital expenditures in 1987 were $308 million, compared with $154 million in 1986.

J.L. Ketelsen, Tenneco chairman and CEO, referring to good results of its industrial businesses, said they were "totally over-shadowed in 1987 by the unsatisfactory performance of Case IH. We have taken major steps to revitalize the company's operations, redirect its focus and improve its management."

He added that by the end of 1988, nine manufacturing plants worldwide will have been closed or downsized. The full effect of these actions and ongoing stringent cost reduction programs will not be felt until 1989, he said.

Deere's 1st Period: Sales Hit $1 Billion

Deere & Co. had its fourth straight quarterly profit in the first period of fiscal 1988 (ended Jan. 31) at $67.5 million, compared with a strike-induced loss of $192.6 million in the same 1987 quarter.

Sales reached $1.045 billion, compared with $419 million a year earlier. Farm equipment volume rose 91 percent to $802 million; industrial equipment volume of $244 million was a 310 percent improvement. North American volume was up 143 percent at $827 million; overseas volume was up 57 percent at $219 million.

Tire Inflation Warning Issued

Armstrong Tire Co. warns that when agricultural tractors equipped with R-1 drive tires are engaged in field-leveling operations, the tires are subjected to high lateral loads. This can cause high lateral deflection and may result in excessive bead chafing and radial cracking in the shoulder area.

Fred A. Fuest, Armstrong consumer affairs manager, advises that inflation of the drive wheel tires in this situation be increased by four pounds (4 psi) over normal rated inflation.

"Provided there is no increase in load, this increase in inflation will help the tires resist lateral deflection," said Fuest. "This should reduce chafing in the bead-rim flange area and stress in the shoulder area during turns."

Varity Posts 1987 Profit of $4.5 Million

Varity Corp., parent company of Massey-Ferguson, has reported a net profit for the fiscal year ended Jan. 31 of $4.5 million (U.S.). Net sales were $1.949 billion. Income before extraordinary items was $51 million.

An extraordinary provision of $60 million relating to the receivership of Massey Combines Corp., of which Varity owns 45 percent, and a gain of $14 million from tax loss benefits of prior years produced the net figure.

Briefly...

Gehl Co. and the People's Republic of China have signed an agreement by which Gehl licenses its skid loader technology to the Xu Zhou No. 2 Construction Machinery Co. The skid-steers will be used in China, and the agreement allows them to be marketed in Hong Kong, Singapore and Malaysia.

1987 Retail Sales of Farm Wheel

	Two-Wheel Drive Tractors										
State	Under 20	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100-119	120-129
Alabama	711	715	435	419	216	123	103	106	2	15	31
Alaska	4	8	2	1	–	2	–	–	1	–	–
Arizona	144	81	31	31	23	44	56	47	7	24	18
Arkansas	775	611	302	256	268	166	94	51	6	12	6
California	1,300	1,030	303	202	287	451	614	267	44	75	55
Colorado	168	136	67	32	39	30	16	16	5	14	18
Connecticut	447	375	109	53	50	15	15	11	8	2	3
Delaware	102	95	29	20	18	16	10	4	1	9	2
Florida	1,087	908	405	410	203	292	447	327	95	36	59
Georgia	1,196	1,042	930	656	348	242	177	239	24	38	59
Hawaii	28	47	30	10	15	10	8	1	–	–	–
Idaho	57	51	17	6	35	38	29	17	11	14	21
Illinois	798	417	114	121	228	150	155	111	18	80	90
Indiana	929	526	169	142	110	113	82	85	13	38	39
Iowa	227	117	34	68	63	122	147	117	49	146	146
Kansas	317	148	57	35	43	77	63	53	19	67	58
Kentucky	625	332	241	372	417	205	106	129	7	9	12
Louisiana	799	695	224	148	62	111	82	26	3	5	25
Maine	360	249	93	23	43	24	13	4	2	3	4
Maryland	948	636	217	131	75	101	46	28	14	20	16
Massachusetts	451	362	151	53	54	41	45	16	4	4	5
Michigan	933	578	200	153	182	143	90	66	32	36	36
Minnesota	247	151	45	50	66	101	101	102	22	111	80
Mississippi	389	547	279	219	138	167	76	81	9	13	14
Missouri	929	516	213	202	226	204	182	153	34	74	45
Montana	69	43	8	12	9	10	22	33	9	22	18
Nebraska	87	35	21	19	15	37	56	78	17	63	99
Nevada	32	28	4	4	4	8	4	7	--	3	–
New Hampshire	521	475	153	53	48	21	9	5	4	3	–
New Jersey	440	480	171	96	52	37	27	13	2	4	3
New Mexico	65	103	70	29	18	30	38	10	5	10	8
New York	1,429	1,101	327	182	269	163	154	195	58	48	45
North Carolina	1,306	1,069	727	1,017	365	254	164	167	10	52	63
North Dakota	92	34	6	9	20	15	27	29	19	48	52
Ohio	1,811	836	247	212	232	205	138	120	39	68	49
Oklahoma	563	361	121	114	108	103	53	61	13	49	46
Oregon	673	280	91	109	114	86	46	50	16	22	27
Pennsylvania	2,188	1,006	326	225	218	198	140	122	41	49	40
Rhode Island	46	31	13	6	9	13	–	1	–	–	–
South Carolina	586	568	274	312	100	91	73	59	5	7	16
South Dakota	37	32	19	10	21	35	40	30	27	73	86
Tennessee	1,163	884	561	817	312	306	121	94	8	28	16
Texas	1,817	1,715	635	751	388	649	308	320	57	132	103
Utah	67	49	28	35	21	29	14	15	8	13	10
Vermont	227	168	54	16	46	40	28	21	7	7	13
Virginia	1,190	804	446	413	342	207	97	110	23	14	30
Washington	371	270	76	128	277	102	62	39	10	7	11
West Virginia	251	102	109	121	75	162	15	9	3	1	1
Wisconsin	321	183	54	74	124	175	160	199	85	90	98
Wyoming	26	6	10	4	14	8	4	7	11	6	14
U.S. Government	–	–	48	20	3	109	–	–	–	1	1
Miscellaneous	8	212	1	58	34	11	179	25	1	–	–
TOTAL	29,357	21,248	9,297	8,659	6,447	6,092	4,736	3,876	908	1,665	1,691

DATA SOURCE: Farm & Industrial Equipment Institute. Figures do not include garden tractors, motor tillers or contractor's off-highway types. Report includes units marketed by these firms: Case International, Deere, Deutz-Allis, Ford New Holland, Hesston, Kubota, Long, Massey-Ferguson, SAME, Steiger, Versatile, White-New Idea and Yanmar. Sales reported as miscellaneous are retail

Tractors by Horsepower (in units)

					Four-Wheel-Drive Tractors					
130-139	140-159	160-179	180 & over	Total 2-Wheel Drive	Under 200	200-249	250 & over	Total 4-Wheel Drive	Total All Farm Wheel Tractors	State
1	39	15	12	2,943	–	1	–	1	2,944	Alabama
–	–	2	–	20	–	–	–	–	20	Alaska
22	30	33	47	638	–	1	1	2	640	Arizona
19	32	158	327	3,083	4	6	21	31	3,114	Arkansas
63	85	125	69	4,970	9	16	24	49	5,019	California
11	43	46	41	682	24	18	17	59	741	Colorado
–	2	–	1	1,091	1	–	–	1	1,092	Connecticut
3	3	5	3	320	2	1	1	4	324	Delaware
2	56	22	26	4,375	24	13	18	55	4,430	Florida
18	111	52	41	5,173	3	–	–	3	5,176	Georgia
–	–	–	–	149	–	–	4	4	153	Hawaii
37	36	47	81	497	9	1	7	17	514	Idaho
117	247	324	234	3,204	35	45	36	116	3,320	Illinois
70	124	169	103	2,712	17	12	17	46	2,758	Indiana
193	463	327	214	2,433	30	13	21	64	2,497	Iowa
62	200	193	199	1,591	47	49	36	132	1,723	Kansas
10	13	18	23	2,519	–	4	4	8	2,527	Kentucky
10	16	95	129	2,430	7	2	14	23	2,453	Louisiana
–	4	2	–	824	–	–	–	–	824	Maine
4	24	7	12	2,279	1	–	1	2	2,281	Maryland
–	2	–	–	1,188	–	–	–	–	1,188	Massachusetts
23	75	52	25	2,624	20	6	8	34	2,658	Michigan
154	220	249	117	1,816	50	46	57	153	1,969	Minnesota
9	40	116	220	2,317	4	8	4	16	2,333	Mississippi
60	85	137	206	3,266	11	11	21	43	3,309	Missouri
16	35	18	16	340	29	18	29	76	416	Montana
109	211	242	225	1,314	36	18	10	64	1,378	Nebraska
1	–	2	2	99	1	–	–	1	100	Nevada
–	–	1	–	1,293	–	–	–	–	1,293	New Hampshire
3	4	4	1	1,337	–	–	–	–	1,337	New Jersey
5	25	15	13	444	–	–	5	5	449	New Mexico
28	51	20	4	4,074	4	–	2	6	4,080	New York
9	75	31	25	5,334	1	–	2	3	5,337	North Carolina
154	183	241	163	1,092	70	58	95	223	1,315	North Dakota
61	117	86	55	4,276	9	7	9	25	4,301	Ohio
30	118	77	40	1,857	29	20	32	81	1,938	Oklahoma
3	35	16	11	1,579	3	3	5	11	1,590	Oregon
32	24	19	12	4,840	4	–	5	9	4,649	Pennsylvania
–	–	–	–	119	–	–	–	–	119	Rhode Island
1	15	10	10	2,127	–	–	2	2	2,129	South Carolina
181	168	242	129	1,130	57	28	33	118	1,248	South Dakota
20	38	56	48	4,472	1	2	3	6	4,478	Tennessee
88	385	401	434	8,183	28	24	43	95	8,278	Texas
4	6	8	1	308	1	–	–	1	309	Utah
1	8	3	–	639	–	–	–	–	639	Vermont
2	15	4	7	3,704	1	–	–	1	3,705	Virginia
8	26	15	31	1,433	9	12	9	30	1,463	Washington
–	1	–	–	850	–	–	–	–	850	West Virginia
89	118	86	44	1,900	15	6	2	23	1,923	Wisconsin
–	8	8	5	131	6	1	1	8	139	Wyoming
–	1	–	–	183	–	–	2	2	185	U.S. Government
–	–	–	–	529	–	–	–	–	529	Miscellaneous
1,733	3,617	3,799	3,406	106,531	602	450	601	1,653	108,184	TOTAL

sales which cannot be classified by state or as U.S. government. They include sales and dispositions that do not go through usual marketing channels such as gifts to non-profit organizations, intraplant or company transfers, etc.

FIEI Marketing & Management Conference ponders:

'Are We Suppliers or Are We Marketers?'

There's an understanding gap between dealers and manufacturers regarding the basics of the marketing job.

By Bill Fogarty

DEALERS want and need more help from their manufacturers on advertising, merchandising and marketing. So stated Earl Streacker, president of the National Farm & Power Equipment Dealers Assn., when he addressed the Farm & Industrial Equipment Institute last fall.

It looks like Earl hit a home run. The FIEI took him seriously and dug into the matter at its Marketing & Management Conference at Tucson, Ariz., in February. They surveyed field equipment dealers, farmstead dealers and themselves on marketing and related basics. They got answers from 292 field equipment dealers (FEDs), 57 farmstead dealers (AEDs) and 46 manufacturers.

As a whole, the marketing executives didn't like what they saw. "Are we suppliers or are we marketers?" was the question put to the group by Bill Templeton, Deutz-Allis, one of the survey reporting panel.

Some of the key questions and answers:

To what extent do you and a representative of your major equipment supplier(s) discuss your marketing plans?

"In great detail," answered 16 percent of field equipment dealers (FED) and 28 percent of farmstead dealers (AED). For 64 percent of FEDs and 56 percent of AEDs, it was "generally a conversational overview." But 20 percent of FEDs and 16 percent of AEDs "really don't get that much into it."

Who of the following, manufacturers were asked, were included in formulating your 1988 sales forecast?

The CEO in 80 percent of cases; the marketing executive in 72 percent of them; sales managers, 83 percent; territory managers, 63 percent; dealers, 41 percent, and other parties by 22 percent of respondents.

Do your territory managers discuss individual marketing strategies and plans with each dealer?

Yes, said 52 percent of the manufacturers. No, said 48 percent.

Did you (dealers) formulate a written marketing plan for your business in 1987?

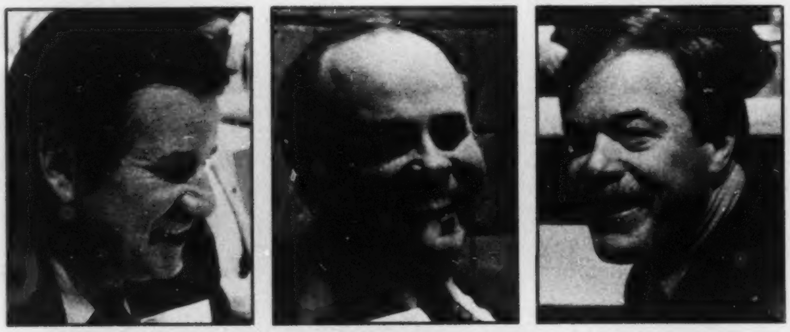
Yes, said 28 percent of field equipment dealers and 36 percent of farmstead dealers. No, said the remainder.

Did you (dealers) set goals for each line in 1987?

Yes, said 43 percent of FEDs and 54 percent of AEDs. No, said the rest.

Who, the dealers were asked, supplies the basic data for discussing market potential?

(More, next page)



PAUL THOMPSON **(left)***, president, Dairy Equipment Co.: "Seventy-two percent of field equipment dealers and 64 percent of farmstead dealers said they did not have a written marketing plan for their businesses in 1987. And only 40 percent of field equipment dealers and 54 percent of farmstead dealers even set a sales goal for each of their lines last year." BILL TEMPLETON* **(center)***, vice-president, marketing, Deutz-Allis: "We manufacturers may need to investigate more closely what we believe our field people are discussing with dealers and what is really being focused on. Dealers and manufacturers seem to be putting discussions about key factors—the types, numbers, and the real marketing-related characteristics of our farmer customers—in the bottom half of importance!" DENNIS SCHWITTERS* **(right)***, executive vice-president, Iowa-Nebraska Farm Equipment Assn.: "Nearly two-thirds of field equipment dealers say they only discuss their marketing plans in a general conversational overview with their major manufacturer. Sixteen percent indicate they go into great detail. What should we make of the fact that nearly 20 percent said they really don't get that much into it?"*

The dealer does, said 45 percent of FEDs and 49 percent of AEDs. The manufacturer does, said the other dealers.

The dealers who said they "didn't get much into a discussion with manufacturers about marketing plans" were asked, *"Have you ever requested assistance?"*

Forty-seven percent of FEDs and 43 percent of AED dealers answered yes; the rest answered no.

Additional questions, as shown in the tables, revealed some areas of general agreement with regard to what is talked about in marketing discussions and what are the most important responsibilities. But there were also basic areas of disagreement on important items.

The survey report was presented by Templeton, who is current vice president of the FIEI's Farm Equipment Div.; Dr. Paul Thompson, Dairy Equipment Co., FIEI Agri-Equipment Div. vice president; and Dennis Schwitters, executive vice president of the Iowa-Nebraska Farm Equipment Assn.

Stalk Your Company

Leo Shapiro, head of a market research and consulting firm, commented that the dealer-manufacturer survey revealed a "typical" situation. "There's an element of following the comfortable route."

Shapiro advocates self-inflicted discomfort as a means of gaining perspective. "We tell our clients, if you want to get a really good look at a strategic plan for your company, have your own management simulate a leveraged buyout of your own company — stalk your own company *before* the raider comes in. But it takes real stomach. It's not easy."

Shapiro added: "Managers are not brought up to be experts in external reality. Most students and then executives are trained and measured on how well they change themselves, not on the degree to which they change the outside world. They win praise by doing what they are told. *This is career management, not corporate management.*

"But eventually, your success depends on the success of the corporation. You find at that point that all that went before is irrelevant.

"Information about the real world is hard to get. The really disturbing stuff is hard to find. News comes to you through channels, and bad news may never reach the top at all. If you guide your company only using bureaucratic information, you'll be on the rocks of crisis before you know it."

Parts Market Share: Route to Recovery?

Stuart MacKay is a consultant specializing in aftermarkets. He has done extensive research on the farm equipment parts aftermarket for the FIEI parts committee in recent years, some of which has been reported in *I&T.* He came before the Marketing & Management Conference to offer this bottom-line approach to dealers (and therefore manufacturers) recovering lost parts market share.

The main thrust of his findings:

1. **Farmers spend** about $7 billion a year on farm equipment parts.

2. **Farm equipment** dealers now get about 60 percent of this market, about 10 share points less than they were getting at the start of the 1980s.

3. **Auto parts** specialty stores now get about 23 percent of the market, up from 17 percent. The farm and fleet stores get about 9 percent. Cooperatives and other outlets get the rest.

MacKay noted that the farmer does the great majority of the work on his equipment himself. He assigns a value to it based on the average dealer service labor rate, around $24, and comes up with a figure of $6.7 billion. Another $1.3 billion is done for the farmer by others, and farm equipment dealers get about 60 percent of that $1.3 billion, the rest going to independents.

MacKay asked his farmer sample if their dealers were price-competitive on parts. Never, answered 13 percent; hardly ever, said 36 percent; occasionally, said 19 percent; usually, said 27 percent; and 5 percent said always.

"The perception becomes reality," said MacKay. "All farmers will pay more for what they perceive to be a *genuine* part, up to an average of 21 percent more. They think, however, that to get that genuineness from the dealer, they must pay a third more."

He said that when the farmer wants maintenance parts (filters, etc.), he heads for the auto parts store 37 percent of the time, the

What's Talked About When Dealers and Factory Reps Review Marketing Plans?

Percent of Surveys (Rank of significance)			
Field equipment dealers	Farmstead equipment dealers	Manufacturers	Topics
67 (1)	67 (2)	72 (2)	Sales programs & incentives offered by mfr.
57 (2)	74 (1)	67 (4)	Sales forecast
56 (3)	61 (5)	72 (2)	Sales potential for line
55 (4)	65 (3)	85 (1)	Co-op advertising
49 (5)	28 (10)	52 (7)	Equipment for demonstrations
47 (6)	61 (5)	52 (7)	Size of trade area
42 (7)	51 (6)	65 (5)	Sales training
40 (8)	25 (11)	31 (11)	Types of farmers
40 (8)	32 (9)	70 (3)	Merchandising and promotion
39 (9)	63 (4)	57 (6)	Dealer sales staff
39 (9)	63 (4)	72 (2)	Sales volume discount
33 (10)	44 (7)	41 (8)	Number of farmers
27 (11)	16 (1)	39 (9)	Retail market information
24 (12)	33 (8)	41 (8)	Sales incentives offered by dealers
19 (13)	32 (9)	NA	Dealer farm show participation
18 (14)	4 (13)	70 (3)	Point of purchase display(s)
17 (15)	25 (11)	NA	Mfr. farm show participation
15 (16)	33 (8)	65 (5)	Farm show participation
13 (17)	16 (12)	33 (10)	Manpower resources available

What Are Dealers' Five Main Responsibilities to Manufacturers?

Percent of Surveys (Rank of significance)

Field equipment dealers	Farmstead equipment dealers	Manufacturers	Responsibility factor
73 (1)	63 (2)	67 (2)	Maintain proper parts stock
70 (2)	39 (7)	26 (9)	Maintain attractive dealership
63 (3)	42 (5)	39 (6)	Maintain proper inventory
61 (4)	65 (1)	91* (1)	Aggressively sell entire line
52 (5)	51 (3)	61 (3)	Train service personnel
44 (6)	35 (8)	33 (8)	Attract farmers to dealership
44 (7)	32 (10)	NA	Promote parts and service
37 (8)	39 (7)	41 (5)	Display equipment prominently
33 (9)	47 (4)	57 (4)	Train sales personnel
29 (10)	42 (5)	39 (6)	Keep up on new features
26 (11)	40 (6)	3 (8)	Advertise dealer-manufacturer association
24 (12)	33 (9)	35 (7)	Tie-in support of mfr. promotions
14 (13)	14 (12)	17 (10)	Identify names, addresses of all potential customers
13 (14)	18 (11)	17 (10)	Provide intelligent sales forecast
11 (15)	9 (13)	13 (11)	Resist major discounted sales of equipment

dealer 36 percent of the time, the farm and fleet 22 percent, the co-ops and other outlets the rest of the time.

How can the industry change the situation so that the dealer gets more of the farmer's parts dollar? MacKay says that dealers must do a lot more of the installation of the parts, "for whoever controls the service business controls the parts business."

MacKay stressed that good service does three things: Cuts off service competition, cuts off parts competition and cuts off wholegoods sales competition.

"I believe service is the key to dealer survival and I think there are significant opportunities."

Comment: The MacKay viewpoint seems hard to dispute. But in the retail marketplace, it is unlikely that dealers will do much in the way of capturing more service business as long as they tend to lose a large amount of money in their service operations, mostly because of management weakness. After MacKay spoke, I put this viewpoint to some industry marketing executives present. I got no argument.

Other Insights

Also on the Marketing & Management Conference program:

Dr. Lynn Daft, consultant on the agricultural economy, said that the general farm income outlook is positive for 1988 and probably for 1989. The large amount of land out of production in 1988 and 1989, "while driving up short-term prices of farm commodities, could then suddenly reverse itself and create another economic crisis."

Don Collins, CEO of Collins Industries, producer of specialty vehicles, focused on aspects of niche marketing. You have to have a position of some dominance in that niche, he said, enough so that others can't push you around.

John Zeeman, senior vice-president, Allegis Corp. (United Airlines), said that his company had a good concept in positioning itself as a total travel company, "but we didn't do well in the execution. We didn't communicate well with employees, we had poor labor relations and we took the press and Wall Street for granted."

Charles Krause, Krause Consultants, moderated a pair of discussion sessions involving the entire group.

Henry Ferguson, consultant on international business, talked about the needs of the global executive.

The Marketing & Management Conference was called to order by **Joseph Ecker,** Gehl Co., president of the FIEI Farm Equipment Div. Program chairman was **Bernard Nielsen,** Gehl Co.

Jay Hesse, Automatic Equipment Mfg. Co., and Ecker reported on the group's "State of the Industry" sales forecast survey, reported in the February issue of *I&T*. ☐

What Are Manufacturers' Five Main Marketing Responsibilities to Dealers?

Percent of Surveys (Rank of significance)

Field equipment dealers	Farmstead equipment dealers	Manufacturers	Responsibility factor
93 (1)	93 (1)	92 (1)	Offer pricing structure acceptable to market
80 (2)	68 (3)	72 (3)	Provide service training
76 (3)	46 (6)	46 (6)	Offer finance plans
61 (4)	81 (2)	87 (2)	Provide sales training for dealer
46 (5)	53 (4)	49 (4)	Provide co-op advertising funds
40 (6)	21 (9)	26 (10)	Provide demonstration equipment
38 (7)	42 (7)	35 (8)	Provide literature, etc.
37 (8)	23 (10)	20 (11)	Offer sales incentives to farmers*
33 (9)	51 (5)	44 (7)	Advertise in farm magazines
24 (10)	32 (8)	30 (9)	Display at major farm shows
23 (11)	21 (9)	48 (5)	Help establish dealer market potential*
22 (12)	21 (9)	NA	Sales incentives direct to dealer personnel*

*Received most "not a responsibility" votes from dealers (about one-third).

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I&T 100 YEARS OF LEADERSHIP

Implement & Tractor

The business magazine of the farm and industrial equipment industry June 1988

We Get Important Letters! page 37

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A growing market factor:

Used Lawn-Garden Tractor Auctions

page 31

Servicing Dealer Is Moving Chain Saws In Volume

page 10

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I&T 100 YEARS OF LEADERSHIP

Implement & Tractor

The business magazine of the farm and industrial equipment industry.

June 1988 • Vol. 103 • No. 7

On Our Cover

The pace and excitement pick up as used lawn and garden tractors roll on the block at Carson Machinery Auction. That bus in the background is a portable field kitchen.

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Features

10: **Chain saws**—growing into "something unbelievable." This Mississippi dealer found that a servicing dealer who can cater to the needs of the pro chain saw-user can develop a substantial volume.

14: **Lawn & Garden Expo:** If you're an exhibitor at this year's show, be sure to bring something new.

16: **Who's going to be at Louisville?** Here's a listing of exhibitors in the Lawn & Garden Expo.

35: **Plastics for agricultural wear parts**—it's been a long time coming, but there are now plastic types which can be used to improve the life of wear parts, such as moldboards and skid shoes, and to cut down on friction and reduce energy requirements.

37: **We get letters:** Subscribers have at it on topics of dealers and dominance, forecasting from the field and shortliners. Editor Bill Fogarty, however, has the last word.

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INDUSTRY UPDATE

April Sales Improve, But Pace Is Down

U.S. retail sales of farm equipment were good in April. But they didn't make the astonishing leaps of earlier months. Farm tractor sales, for example, were up 6.2 percent in April, but up 18 percent for the year. Earlier, some industry observers noted that we might be seeing some minus signs in coming months as the industry runs into shortage situations on some product categories. Meanwhile, as of mid-May, many areas of the midwestern states were concerned about moisture shortages.

Unit Retail Sales

Equipment	April 1988	April 1987	April % Change	January-April 1988	January-April 1987	January-April % Change
Farm Wheel Tractors:						
2-Wheel Drive						
Under 40 HP	7,987	7,910	1.0	18,375	18,253	.7
40 & Under 100 HP	3,344	3,213	4.1	11,093	8,727	27.1
100 & Under 140 HP	518	390	32.8	1,685	1,055	59.7
140 HP & Over	1,064	712	49.4	3,986	1,930	106.5
Total 2-Wheel Drive	12,913	12,225	5.6	35,139	29,965	17.3
4-Wheel Drive						
Under 200 HP	84	74	13.5	336	191	75.9
200 HP & Over	160	88	81.8	599	292	105.1
Total 4-Wheel Drive	244	162	50.6	935	483	93.6
Total Farm Wheel Tractors	13,157	12,387	6.2	36,074	30,448	18.5
Combines (Self-Propelled)	182	171	6.4	1,583	485	226.4
Balers (Bales under 200 lbs)	384	334	15.0	1,016	863	17.7
Forage Harvesters (Shear Bar Type)	106	126	(15.9)	358	351	2.0
Mower Conditioners	828	755	9.7	2,174	1,856	17.1

INVENTORY WATCH

After years of trying, North American farm tractor and combine manufacturers apparently have their inventories of high-ticket models in the range they want them. As of March 31, 1988, supplies of over-100-hp tractors were running about 30 percent of sales through the previous 12 months. Until the fall of 1986, inventories in that category had continuously exceeded sales. The heavy flushing out of big tractor inventory began in mid-1987, when Case IH began an aggressive clean-out program to make room for a new line brought out in the fall of last year.

At presstime, I&T talked to spokesmen for three major U.S. tractor companies about their current big tractor production. They indicated that while production was strong, there were currently no extraordinary production efforts.

White-New Idea, in the midst of a move of some tractor production activities from Charles City, Iowa, to Coldwater, Ohio, indicated that its output had been slowed but that it would be increased substantially in the fall to make up for earlier gaps.

According to a White-New Idea spokesperson, castings, heat treatings, machining and other work is done at Charles City, with its output shipped to Coldwater for line work.

A Case IH spokesman said that its Racine tractor works is currently running one full shift plus some support activities on a second shift. There is no Saturday or Sunday work, however. "Our ability to manufacture tractors depends to a great extent on suppliers getting components to us as needed."

Ford New Holland's big tractors, the TW series, are produced at its plant at Antwerp, Belgium. The production schedule there has been increased by "a modest amount," according to a spokesman.

As of March 31, inventory of self-propelled combines was running about 40 percent of sales in the previous 12 months. The heaviest sales season for combines is in the fall.

The only major product category in the inventory reports provided by the Farm & Industrial Equipment Institute which shows stockpiles exceeding sales is tractors under 40 hp. Most of these tractors are made in Japan. In 1987, as the U.S. dollar declined against the Japanese yen, retail sales declined from those of the previous year for the first time since 1982. However, inventories went up, presumably as a hedge against further dollar declines. They eased off somewhat in the 12 months up to March 31, 1988.

Equipment	Inventory Levels Mar. 31, 1987	Oct. 31, 1987	Nov. 30, 1987	Dec. 31, 1987	Jan. 31, 1988	Feb. 29, 1988	Mar. 31, 1988	12-Month Sales, Apr. 1, 1987-Mar. 31, 1988
Tractors								
Under 40 hp	70,311	59,399	60,981	60,179	62,176	63,479	64,921	59,947
40-99 hp	22,949	18,996	19,622	20,042	20,309	19,983	19,629	32,953
100 hp and over	12,561	6,306	5,704	5,524	5,142	5,578	5,379	18,117
Four-wheel drive	1,592	1,474	1,598	1,697	1,763	1,813	1,739	2,023
Total Tractors	107,413	86,175	87,905	87,442	89,390	90,871	91,668	113,040
S-P Combines	4,994	4,496	4,044	3,588	3,401	3,575	3,443	8,259

Source: Farm & Industrial Equipment Institute

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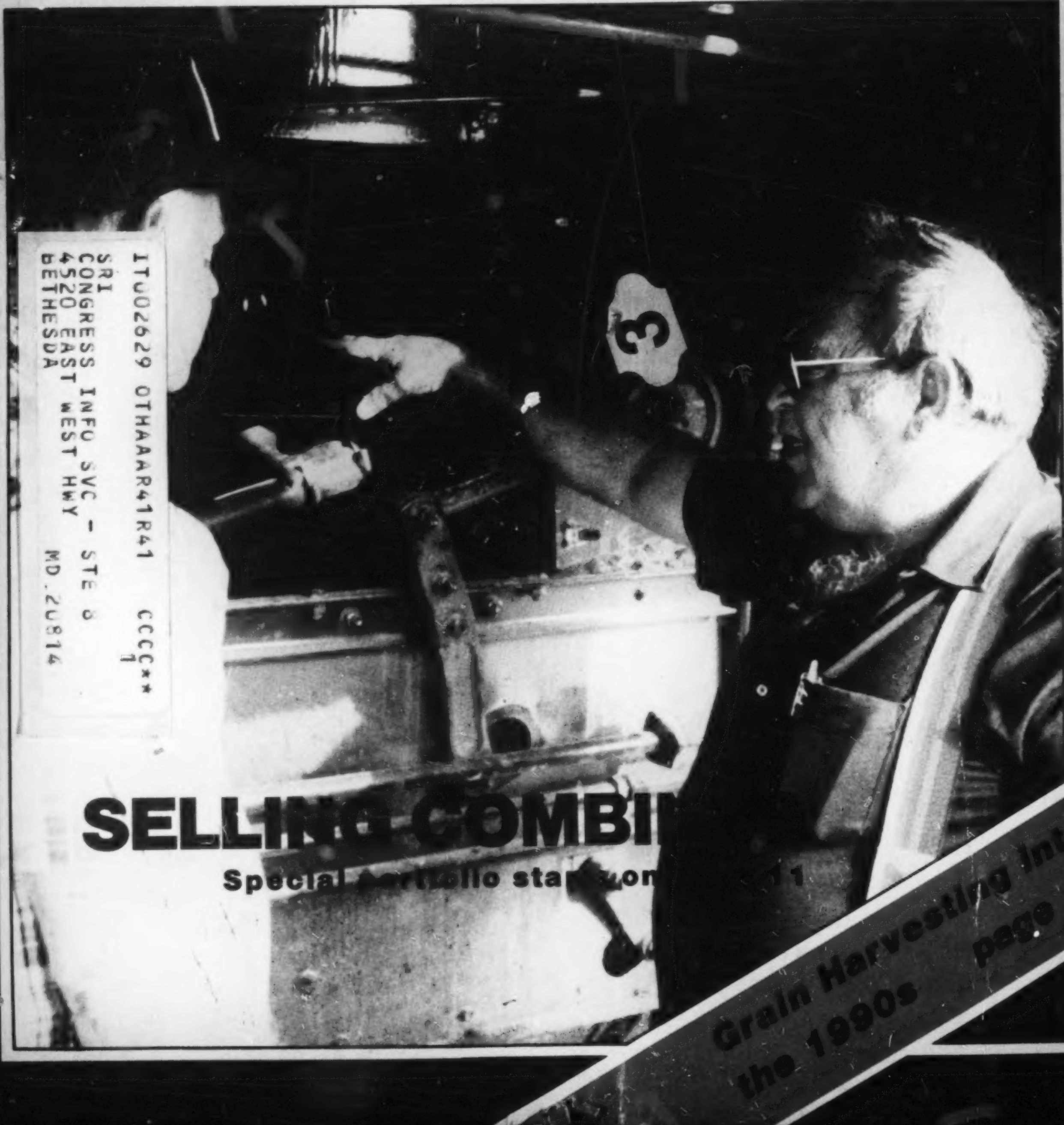
Implement &Tractor

The business magazine of the farm and industrial equipment industry July 1988

1988-89 Conventions, Shows page 26



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Grain Harvesting into the 1990s page 14

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On Our Cover

Farmer Don Fiddler (left), Belvidere, Ill., and Al Degner, salesman at Walker-Schork International, talk about the combine Don recently purchased. (Larry Stewart photo.)

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Features

11 **I&T mini-survey** provides interesting ideas from some top-selling combine dealers.

14 **Combine planners** say the demand for bigger capacity will be met by better — not physically bigger — machines.

18 **The only** way to sell something new is to demonstrate it and show that you know how to keep the customer happy, says dealer Bob Lindeman.

25 **Conventions, meetings and** equipment shows: details for the coming year.

30 **Clay Equipment** put in an employee stock ownership plan four years ago and they like the results.

33 **Manufacturers' concerns** about supplies were evident at FEMA's recent Spring Management Clinic.

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BRIEFS

Racine Fluid Power, Inc., the newly formed subsidiary of Robert Bosch Corp., Broadview, Ill., has acquired the Racine Hydraulics Div. of Dana Corp., Toledo, Ohio.

Kyle International, Ltd., Virginia Beach, Va., will be sole importer and distributor of the Hako-Werke line of groundskeeping equipment built in Bad Oldesloe, West Germany. After distribution is set up, plans are to begin assembly operations at Virginia Beach.

Deere & Co. has entered a non-exclusive joint marketing agreement with Yetter Mfg. Co., Colchester, Ill., for the Yetter 6600 series coulter cart, to be used on Deere 515 and 520 grain drills for no-till seeding. The cart will be marketed by Deere under the Yetter name.

M & W Gear Co., Gibson City, Ill., has acquired all assets of the Willsey-D Corp., Maple Hill, Kan. The line of Grazier lawn and commercial mowing equipment will continue to be made at Maple Hill.

In Canada, the tri-province Prairie Agricultural Machinery Institute has become a bi-province operation. Alberta decided not to continue supporting the program of operating farm equipment research and test centers in each of the three Prairie Provinces. Alberta will set up the Alberta Farm Machinery Research Center, using the former PAMI facility at Lethbridge, Alta.

Unverferth Mfg. Co., Kalida, Ohio, has acquired selected assets of Brent Industries, Shell Rock, Iowa. Brent products include yield carts, gravity wagons, grain trailers, stalk shredders and grain carts. They will continue to be made at the Iowa location.

Brillion Iron Works, Inc., Brillion, Wis., has been acquired by Truck Components, Inc. (TCI), Oak Brook, Ill. Brillion will operate as a TCI subsidiary, with Karl Galer continuing as president and chief executive officer. He will report to Anthony Girone, TCI chief operating officer.

Gehl Co. has been named 1987 Business-to-Business Marketer of the Year by the Milwaukee chapter of the American Marketing Assn.

What They're Saying...

Unbridled Advocacy

Lee Iacocca, chairman of the board of Chrysler Corp., spoke to the American Bar Assn. at its San Francisco convention.

A small company in Virginia that made driving aids for handicapped people went out of business because it couldn't afford the liability insurance. Too risky. There used to be 18 companies making football helmets in this country, but the liability crisis has pared them down to just two. Nobody makes gymnastics or hocky equipment anymore. Too risky. One of these days, we're going to wake up and say, "Competing is just too risky."

I'm no lawyer, but I think they're supposed to punish gross negligence or reckless disregard for safety. I can't argue with that. If somebody is totally irresponsible, he should pay for it. But I'm afraid we're beginning to punish some of the normal risks that simply can't be avoided when you produce almost any kind of product. And when we punish normal risk, we're punishing competitiveness and we're punishing progress.

If we're not willing to accept some of the risks that other countries are, then even if the Constitution lives to 300 years, I'm not sure there'll be much to celebrate.

Now don't get me wrong. Some of these issues need to be debated. And we need strong advocates on both sides in order to find the answers. But if the debate never ends, if compromises are never reached short of the courthouse, then we go nowhere.

Advocacy is your profession. Advocacy is fine. It's unbridled advocacy that's the problem today. And it's getting out of hand. Advocacy may be necessary to settle our legitimate differences, but unbridled advocacy seems to be creating differences that we didn't know we had, that we probably can't afford.

It's time to change some of the rules, even if we have to compromise some of our rights to do it. America just can't afford all this unbridled advocacy. It's been our willingness for 200 years to find sensible compromises that has kept the Constitution alive. It was born in compromise and survived because of compromise. As soon as we forget how to compromise, I think it is doomed.

Site-Specific Optimum Tillage

Dr. Richard Johnson is senior scientist at Deere & Co.'s Technical Center in Moline, Ill. At the International Symposium on Agricltural Mechanization in Bologna, Italy, he said:

Future advances in crop yield will demand further improvements in machine productivity and the trend toward modular design will also likely continue.

Since the beginning of mechanized agriculture, most tillage systems have involved primary tillage with a moldboard plow followed by several secondary tillage passes to produce a residue-free, smooth seedbed. Though this type of tillage will continue to predominate in several areas, other regions will increasingly adopt conservation tillage systems that leave rougher, residue-covered soil surface for soil erosion control.

Tillage practices differ not only from one region to another but often within a given farming unit. Optimum tillage practices are becoming site-specific, much like fertilizer and crop cultivar inputs. Diverse tillage practices necessitate that tillage and planting equipment be designed to handle a much broader range of field conditions.

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I&T Surveys Top Combine Dealers

Demonstrations and Margins—Is There a Connection?

Most of these combine dealers say the tryout is needed in a small minority of deals. But one brand's dealers have a different experience. And they get better gross margins, too. Hmmm.

By Bill Fogarty

SOME DEALERS are good at selling combines without a demonstration. Others say it's necessary most of the time. Who's right?

That's one of the questions that emerges from an *I&T* mini-survey. We asked four combine manufacturers—Case IH, Deere, Deutz-Allis and Ford New Holland—to give us the names of some of their top-selling combine dealers. They came back with 48 names, and of these, 26 answered our survey.

Over a four-year span, these 26 dealers have sold (or expect to have sold, by the end of 1988) 962 new combines and 1,927 used ones. That works out to 37 new and 74 used units per dealer, or about nine new and 18 used per year.

We asked the dealers to identify the brand of combine they sell, how long they have been selling it, and how many new and used units they sold in 1985, 1986 and 1987 and (estimated) 1988. We also asked them to estimate their *typical* gross margins for new and used combines in each of those years. (We made a small mistake here. We should have asked specifically for percentages. We didn't, and some of the replies were in dollars, which we had to exclude.)

Another question: "About what percent of new combine sales require a demonstration?" We also noted that since many dealerships have folded up and surviving dealers are meeting some of their former customers, "what percentage of combine sales in 1987 and 1988 have been to new customers?"

Finally, we asked them to rank various influences as to their importance in buying decisions today.

The rate of response was very strong—26 out of 48 makes us feel grateful for these dealers' interest in our project. We surveyed in the middle of their busy season, May. We might have done even better if it hadn't been for one circumstance: The Deutz-Allis dealers we surveyed were off on a company trip to Germany at the

I. What Percentage of New Combine Sales Require a Demonstration?

This table sets out the individual responses of all 26 dealers, separated out by combine brand.

Case IH dealers' combine sales	Deere dealers' combine sales	Deutz-Allis dealers' combine sales	Ford New Holland dealers' combine sales
10%	2%	10%	80%
N.R.	0-2	0-10	80
0	20	0	20-25
0	10	10	80
10	N.R.	15	25
0	N.R.		100
95	10		
	10		
Average pct. of sales that required a demonstration:			
19	9	8	65

N.R.—No reply given.

(More, next page)

(SURVEY, from previous page)
time our questionnaire hit their desks. Even so, five of 18 D-A dealers answered the survey.

Veteran Sellers

When we started this project, one thought haunted us. Will we get the names of dealers who are new, whiz-bang, high-volume dealers—who usually go broke three years after they start? Apparently, we did not.

Four of the 26 dealerships are in their fourth year of selling their make of combine. Some of these may have been in business longer than that. The rest are long on experience in combine sales. For instance, all but one of the Case IH dealerships have been in the business for over 20 years, some for as long as there have been combines. The overall average was just over 20 years.

Thus, when they talk about their margins, it is likely they have a good idea of what it takes to survive in this business.

Demos, Margins: A relationship?

When we started this survey project, we didn't know if we would come up with something significant or merely assemble some interesting facts. We still can't be sure, but we think we have a good point worth a lot of pondering.

First, take a look at Table I. Dealers estimated about how many new combine sales required a demonstration. Consider that all Deere and Deutz-Allis dealers and all but one Case IH dealer said that relatively few sales need a demo. And look at the importance the Ford New Holland dealers attach to demonstrating!

Why is that? Are Ford New Holland people trained to regard the demonstration differently than other dealers? Or is it because in the combine marketplace, Ford New Holland is the relatively new kid on the block and has to demonstrate more?

Now consider Tables IIa and IIb, which deal with dealers' gross margins on new and used combines. The Ford New Holland dealers report bigger margins and they also report more demonstrating. Is there a connection?

One FNH dealer, who said that 80 percent of combine sales need a demonstration, added this: "We have a very innovative combine to sell. This is why demonstrating is the main selling point. We put in from 250 to 350 hours a year demonstrating in barley, wheat, soybeans and corn. These machines today have large enough capacity to handle all crop conditions. Rotary combines got a bad name when they were first introduced because in tough conditions they couldn't put it through the way conventional combines did. This is why for us, demonstrating goes a long way to selling a combine."

Unfortunately, this is one of the dealers who expressed his margins in dollars rather than percentages, so we couldn't see if there was a relationship between his demonstrating and his margins. He sold 11 new and 14 used combines last year and expects to do better this year.

The ultimate answer to the question, of course, would require a very broad survey of all dealers, one that *I&T* isn't staffed to do. This survey, remember, covers a small number of dealers who lead the pack in terms of unit sales volume.

The Big Influences

Table IV shows how dealers ranked seven factors we set forth in our questionnaire. The quality of the dealership noses out price as the No. 1 factor, but not by much. The price factor is also a very strong No. 2 influence, in these dealers' opinions.

After listing these seven influences on the combine buying decision, we left a large space, marked "other," for dealers to mention anything they didn't think was covered in the seven

IIa: Dealers' Typical Gross Margins on New Combine Sales (Estimated)

	1985	1986	1987	1988 (est.)	Four-year average
Case IH dealers' average margin	7.6%	8.2%	7.4%	9.4%	8.1%
Deere dealers' average margin	6.5	6.5	7.3	8.6	7.2
Deutz-Allis dealers' average margin	4.0	5.5	10.5	10.5	7.6
Ford New Holland dealers' average margin	13.0	10.3	7.3	9.3	10.0
All dealers' average margin	7.7	7.6	7.7	9.3	8.1

IIb: Dealers' Typical Gross Margins on Used Combine Sales (Estimated)

	1985	1986	1987	1988 (est.)	Four-year average
Case IH dealers' average margin	8.8%	8.6%	10.0%	11.0%	9.6%
Deere dealers' average margin	9.7	9.3	7.2	8.6	8.7
Deutz-Allis dealers' average margin	7.0	8.5	12.0	12.0	9.9
Ford New Holland dealers' average margin	17.6	15.7	14.7	16.7	16.2
All dealers' average margin	10.6	10.2	10.7	12.5	11.4

III: What Percent of Combine Sales Are to New Customers (1987, 1988)?

Combine dealer	Estimated percentage of sales	Range of estimates (percentage)
Case IH	35	10-70
Deere	20	5-35
Deutz-Allis	30	15-60
Ford New Holland	30	10-50

we named. Here are their responses:

•"Price is the reason new combines get sold, no matter whose brand—25 to 45 percent discounts on all makes."

•"I'd like to think dealership reputation would be No. 1 because of the large inventory of parts, because of years of mechanical experience our servicemen have, because of a new, modern building, because of all the latest shop tools to service the most sophisticated equipment and because of our friendly, helpful personnel.

"But all this gives us is an opportunity to compete with the cutthroat down the road operating out of a gas station. If we can meet his price, we'll probably get the deal."

•"It's a combination of factors that works—machine reputation, dealer support and, of course, trade difference in dollars."

•"Axial flow's unquestioned superiority in rice fields."

•"Having used combines field-ready, and company discounts help, too."

•"Availability. Inventory is getting more scarce. The dealer who has what the customer wants will have the best chance to make the sale."

•"Availability. In the next six months, combines will become as tractors have become, real short. The majors have gone back to retail much faster than the dealers have. We dealers are slow to add on to our margins, and we're the ones who need margin more than the manufacturer."

> **"We dealers are slow to add on to our margins, and we need margin more than the manufacturer does."**

•"You need to sell a combine with a good reputation, and give good parts and repair service."

•"Demonstration is critical."

•"Parts availability when the customer walks in."

New Customers

In 1987 and 1988, as Table III shows, these dealers were making sales to new customers in about 30 percent of their deals. Some of these newly landed buyers have to be former customers of dealers who have gone out of business or who can no longer supply combines (*i.e.*, Massey).

Other Comments

I&T editorial surveys always invite the respondent to write opinions on the back of the sheet, in the margins, wherever there's space, and sometimes we learn something we didn't know. Here are some additional dealer remarks:

•"Our company, J.J. Nichting Co., Pilot Grove, Iowa, was started in 1920. We have always been the leader in combine service with the largest inventory in this area. We have increased our combine market share to 70 percent in the area we cover."

•"Our big problem is selling used combines with high hours. Cannot find a good outlet."

•"It's getting harder all the time to make a profit with Case IH giving combines away."

•"Used combine margin must be taken with a little grain of salt. About half to a third of this margin was accredited to write-downs of inventory at the end of this year."

Conclusion

This survey doesn't prove anything. But if I were in the business of selling combines, I'd think long and hard about the experience of the Ford New Holland dealers who demonstrate so much and are experiencing better margins.

Maybe once you've gotten the prospective buyer to try out your machine, even though he's done business with you before, it's easier to hold your margin.

Or am I failing to see something? If you have a comment, please drop the writer a note. ☐

IV: Top Dealers Rate the Major Influences In Today's New Combine Buying Decisions

Influence	No. 1 Votes	No. 2 Votes	No. 3 Votes	No. 4 Votes	No. 5 Votes	No. 6 Votes	No. 7 Votes
Price and discount	9	9	1	4	1	0	0
Financial terms	2	4	7	4	0	4	2
Trade-in allowance	1	5	4	5	2	3	3
Combine's mechanical, technical improvements	3	3	3	5	2	2	5
Old combine worn out	1	3	5	1	6	3	4
Backup reputation of dealership	10	1	4	5	4	1	0
Farming more acres, trading up	2	1	4	2	7	3	4

Note: In ranking the major influences, some dealers gave equal importance to two or more. Thus, while 24 of our 26 responding dealers participated in this ranking, there were 28 No. 1 votes cast.

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The business magazine of the farm and industrial equipment industry August 1988

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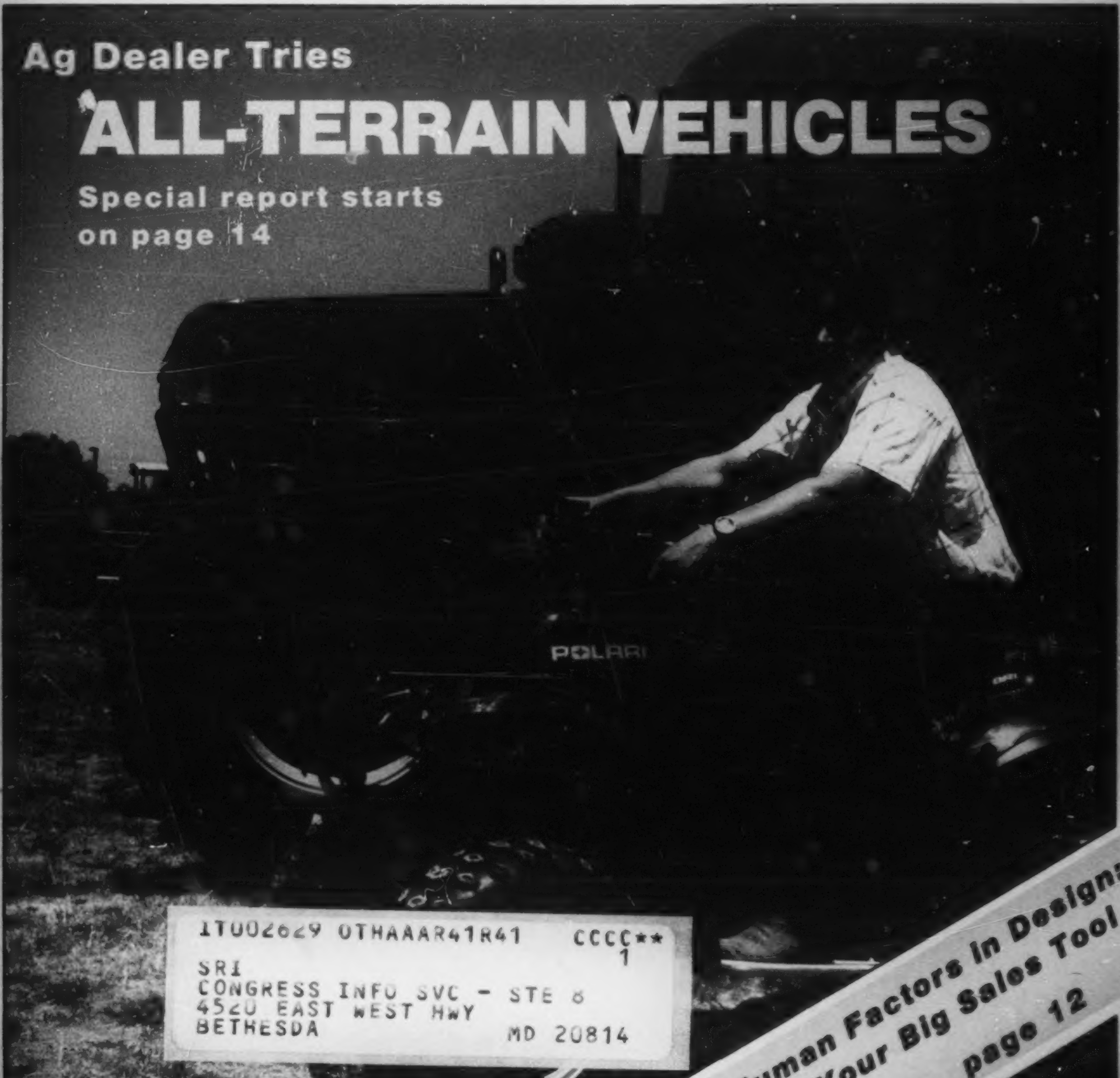

Ag Dealer Tries

ALL-TERRAIN VEHICLES

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Implement & Tractor

The business magazine of the farm and industrial equipment industry.

August 1988 • Vol. 103 • No. 9

On Our Cover

Mark Nicholas, Case IH dealer at Canton, Miss., is looking forward to a profitable sideline in all-terrain vehicles.

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Features

6: **Tillage research** is gaining significance thanks to mounting conservation concerns.

9: **Defining what quality** means to customers and satisfying them are keys to selecting power equipment lines.

12: **With operator comfort** and convenience translating into greater productivity and safety, more and more manufacturers are considering "human factors."

14: **The All-Terrain** vehicle industry is going through major changes that could impact agricultural equipment dealers.

26: **New hay equipment** approaches reflect the growing importance of the crop.

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June Retail Sales Mixed: High-Ticket Units are Up

In June, retail sales of farm equipment in the United States showed signs of weakening as a result of drought. However, sales levels remained very positive in some product areas. Four-wheel-drive tractors, two-wheelers over 100 hp and combines were up substantially. A 14 percent decline in tractors under 40 hp, mostly from Japan, was attributed partly to drought and partly to price resistance.

UNIT RETAIL SALES

Equipment	June 1988	June 1987	June % Change	January-June 1988	January-June 1987	January-June % Change
Farm Wheel Tractors:						
2-Wheel Drive						
Under 40 HP	7,232	8,427	(14.2)	32,025	34,014	(5.8)
40 & Under 100 HP	3,613	3,678	(1.8)	17.713	15,074	17.5
100 & Under 140 HP	314	327	(4.0)	2,328	1,645	41.5
140 HP & Over	711	545	30.5	5,356	2,989	79.2
Total 2-Wheel Drive	11,870	12,977	(8.5)	57,422	53,722	6.9
4-Wheel Drive						
Under 200 HP	103	41	151.2	517	260	98.8
200 HP & Over	162	76	113.2	890	421	111.4
Total 4-Wheel Drive	265	117	126.5	1,407	681	106.6
Total Farm Wheel Tractors	12,135	13,094	(7.3)	58,829	54,403	8.1
Combines (Self-Propelled)	499	392	27.3	2,288	987	131.8
Balers (Bales under 200 lbs)	1,418	1,417	.1	3,136	2,743	14.3
Forage Harvesters (Shear Bar Type)	423	394	7.4	978	890	9.9
Mower Conditioners	2,742	3,290	(16.7)	6,566	6,485	1.2

Canada's First Half Strong; June Mixed

Canada's first six months produced solid increases in unit sales of most product groups. But June results were mixed.

Tractor sales for the year were up 4 percent at 8,354 units, with sales of tractors under 40 hp showing the only six-month decline—by 11 percent to 2,160 units. In June, tractor sales were down 6 percent to 1,670 units, led by tractors under 40 hp (-14 percent to 507) and two-wheelers over 100 hp (-26 percent to 154 units).

For the six months, mower conditioners were up 19 percent to 1,431, big balers up 14 percent to 1,259, small balers down 3 percent to 700, forage harvesters up 36 percent to 245, self-propelled combines up 62 percent to 276 units, pull-type combines up 14 percent to 64 units, self-propelled swathers up 41 percent to 205, and pull-type swathers up 19 percent to 154. June volumes were down on big balers, pull-type combines and pull-type swathers, up on the others.

Despite Drought, FIEI Forecast Is Upbeat

Manufacturers of field farm equipment expect all U.S. retail sales in 1988 to end up about 5 percent ahead of last year. This was learned in a June survey taken by the Farm & Industrial Equipment Institute to update an identical survey taken six months earlier.

The earlier, "pre-drought" survey had produced the same median increase figure of 5 percent The range of 28 opinions last winter was from minus 4 percent to plus 10 percent. The range of 24 in June was from minus 17.5 percent to plus 20 percent.

Here are manufacturers' winter and summer forecasts in terms of unit sales at retail by product. The figures shown are median estimates.

Product	1988 Original Forecast	1988 Updated Forecast	Percent Change from '87
Tractors			
2-wheel drive			
Under 40HP	60,000	57,027	-4.8
40-99 HP	31,210	32,807	+6.8
100 HP & over	14,500	17,104	+7.5

(More, next page)

Canadian Retail Sales: Outlook Stays Strong

As of April, Canadian farm equipment firms were generally optimistic about 1988 retail sales. That's what is indicated by a survey released in June by the Canadian Farm & Industrial Equipment Institute. Here's how the original 1988 forecast, released in November, 1987, compares with the spring outlook for 1988:

Product	Original Forecast	Revised Forecast
All tractors	17,805	17,522
2-Wheel Drive		
Under 40 hp	4,596	4,612
40 to 99 hp	9,466	9,041
100 hp and over	2,830	2,927
4-wheel	913	942
S-P combines	1,580	1,650
P-T combines	542	475
S-P swathers	930	900
P-T swathers	1,383	1,433
Balers (under 200#)	1,589	1,568
Balers (over 200#)	3,270	3,304
Forage harvesters	513	492

(More, next page)

U.S. Forecast *(from page 23)*

4-wheel drive	1,800	1,810	+9.5
All farm tractors	107,510	108,748	+0.5
S-P combines	6,890	7,502	+4.6
Cornheads	4,100	4,120	+5.0
Windrowers	1,500	1 649	+5.0
Balers*	5,500	5,620	+5.0
Balers**	10,350E	10,500E	+5.0
Mower-Conditioners	11,488	11,689	+4.0
Forage harvesters	2,400	2,400	+5.3
Grinder-mixers	2,050	2,912	+17.5
Manure spreaders			+8.2
Chisel plows			+7.0
Disk Harrows			+5.0
Field cultivators			+6.0
Parts sales			+6.8

*Bales under 200 lbs. **Bales over 200 lbs. E - I&T estimate.

I&T's September issue will report on the 1989 portion of the FIEI's updated retail sales forecast.

Canadian Forecast *(from page 23)*

Mower-conditioners	2,557	2,551
Manure spreaders	1,712	1,859
Grinder-mixers	225	213
Moldboard plows	511	438
Chisel plows	1,000	1,182
Dish harrows	576	544
Grain drills	2,601	2,940
Corn planters	348	404

MF Buys Combine

In Canada, the Ontario court has approved the acquisition by Massey-Ferguson, Inc., of the conventional combine business that had been a part of Massey Combines Corp.

MCC went into receivership earlier in 1988 and the receiver, Peat Marwick Ltd., Toronto, has sold off several parcels of the company's assets.

Canadian newspapers have reported that the price on the conventional combine deal was $8 million (approximately $7 million in U.S. funds). MF Inc. bought inventories, dies, fixtures and other tooling, but not the combine factory at Brantford, Ont.

Massey-Ferguson is promising its dealers that it will have a combine line for them to sell in 1989. A spokesman for the company said that MF is currently sourcing a combine in line with the promise. MF takes over the business as of October 1.

Commented the MF spokesman: "We originally wanted to buy the conventional combine for the substantial parts business that it represents. There are many MF combines in the field and our dealers and customers need the source. It also holds up the value of the Massey-Ferguson name on all products."

Earlier, it was announced that the MCC receiver had sold the rotary combine technology, inventory, tooling, etc., to Greenland, Amsterdam-based parent company of Vicon, which operates a plant at Portage la Prairie, Man.

Tractor Assembly Starts at Coldwater

White-New Idea Farm Equipment Co. began assembly of White tractors June 6 at its Coldwater, Ohio, facility. Assembly had previously been done at Charles City, Iowa.

The company says it has invested $2 million in the new assembly line, which includes an improved paint system, and that a cost savings of approximately $12 million is expected from the White-New Idea consolidation. These workers are assembling a run of 140-hp White units. In 1989, White-New Idea will begin producing three tractor models for Deutz-Allis Corp.

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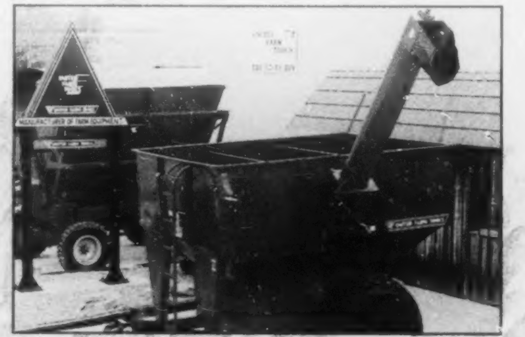

Grain Buggy

The 500 Bushel Grain Buggy is a 14" diameter single auger model.

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Implement & Tractor

The business magazine of the farm and industrial equipment industry

September 1988

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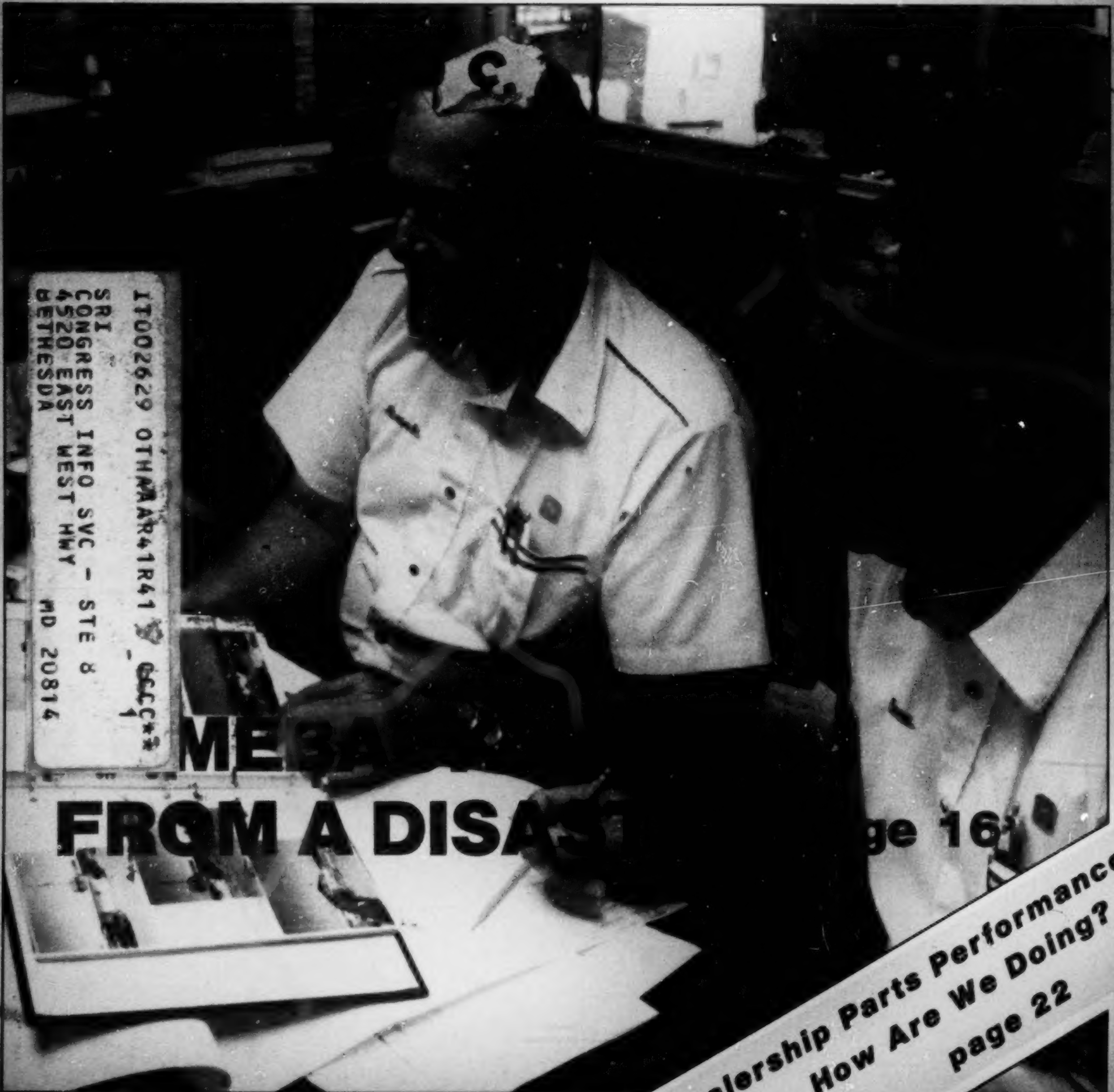

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I&T 100 YEARS OF LEADERSHIP

Implement & Tractor

The business magazine of the farm and industrial equipment industry.
September 1988 • Vol. 103 • No. 10

On Our Cover

Partners Frank Fuller (left) and Tom Thurman review the destruction and rebuilding of their Iola, Kan., dealership's shop.

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Features

10: **Dollar losses** remain high in dealership service operations. Are labor rate hikes the only answer?

13: **Maybe it's time** for your office to invest in a bit of electronic wizardry—a facsimile machine.

22: **A seven-year examination** of performance data shows some, but not much improvement in ag dealers' parts departments, with declines in the critical area of gross margins.

26: **Service personnel** and equipment operators can use their senses of smell, touch, sight and hearing to detect problems or prevent them in hydraulic systems.

28: **How well** does a piece of equipment perform after assembly or repair? Is the planting rate correct? How precisely are chemicals being applied? What are harvest loss rates, and are they acceptable?

32: **Report from Britain's Royal Show:** Tractor sales are bouncing up again.

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INDUSTRY UPDATE

July Retail Sales Show Full Impact of Drought

The monthly flash report of the Farm & Industrial Equipment Institute shows that U.S. retail sales in July took a drop in almost all product categories. Only two-wheelers over 140 hp and four-wheelers under 200 hp showed improvements. For the full seven months of 1988, however, the totals are very positive in most groupings.

UNIT RETAIL SALES

Equipment	July			January-July		
	1988	1987	% Change	1988	1987	% Change
Farm Wheel Tractors:						
2-Wheel Drive						
Under 40 HP	4,043	5,462	(26.0)	36,065	39,476	(8.6)
40 & Under 100 HP	2,549	2,766	(7.8)	20,286	17,840	13.7
100 & Under 140 HP	201	290	(30.7)	2,527	1,935	30.6
140 HP & Over	783	710	10.3	6,138	3,699	65.9
Total 2-Wheel Drive	7,576	9,228	(17.9)	65,016	62,950	3.3
4-Wheel Drive						
Under 200 HP	38	21	81.0	555	281	97.5
200 HP & Over	64	67	(4.5)	954	488	95.5
Total 4-Wheel Drive	102	88	15.9	1,509	769	96.2
Total Farm Wheel Tractors	7,678	9,316	(17.6)	66,525	63,719	4.4
Combines (Self-Propelled)	371	749	(50.5)	2,659	1,736	53.2
Balers (Bales under 200 lbs)	814	972	(16.3)	3,968	3,715	6.8
Forage Harvesters (Shear Bar Type)	167	197	(15.2)	1,145	1,087	5.3
Mower Conditioners	1,031	1,484	(30.5)	7,600	7,969	(4.6)

Kubota to Start U.S. Production in January

Kubota, Ltd., the Japanese manufacturer of small and medium-sized tractors, is building a 70,000-sq.-ft. manufacturing plant on 151 acres in Gainesville, Ga., near Atlanta.

Scheduled to be in production by Jan. 1, 1989, Kubota Mfg. of America will initially employ 50 employees and make loaders for Kubota tractors. Plans are to expand output to include other products for the U.S. market.

Straightening Out Some Show Dates

In our listings of major farm equipment shows overseas and in North America, we blew a few.

We started out telling you that the Australian National Field Days would be Nov. 15-17, 1988, at Orange, New South Wales. So far, so good. But then we told you that the DLG Agritechnica '89 would be held Nov. 28-Dec. 2, 1989, in South South Wales, Australia. Sorry, we missed by two continents. The DLG Agritechnica will be held on those dates at Frankfurt, West Germany. Contact: DLG, Zimmerweg 16, D-6000 Frankfurt, West Germany.

Inadvertently unlisted:

National Farm Machinery Show, Feb. 15-18, 1989, Kentucky Fair & Expo Center, Louisville, Ky. Contact: Box 37130, Louisville, 40233, phone 502/366-9592.

Southern Farm Show, Feb. 15-18, 1989, North Carolina State Fairgrounds, Raleigh, N.C. Contact: Box 36859, Charlotte, N.C. 28236, phone 800/334-0248.

INVENTORY WATCH

What's Happening To Stockpiles In Relation To Sales.

Equipment	Inventory Levels							12-Month Sales, July 1, 1987 June 30, 1988
	June 30, 1987	Jan. 31, 1988	Feb. 29, 1988	Mar. 31, 1988	Apr. 30, 1988	May 31, 1988	June 30, 1988	
Tractors								
Under 40 hp	61,855	62,176	63,479	64,921	62,361	59,761	57,223	57,978
40-99 hp	20,834	20,309	19,983	19,629	20,047	19,954	19,490	33,381
100 hp and over	11,952	5,142	5,578	5,379	5,463	5,963	6,472	18,958
Four-wheel drive	1,480	1,763	1,813	1,739	1,730	1,714	1,659	2,379
Total Tractors	**96,121**	**89,390**	**90,871**	**91,668**	**89,601**	**87,392**	**84,844**	**112,696**
S-P Combines	6,104	3,401	3,575	3,443	3,875	4,185	4,143	8,473

Source: Farm & Industrial Equipment Institute

CDB service data review:

Industry Shop Average Mired in Red

Dollar losses remain high in dealership service operations. Are labor rate hikes the only answer?

By Bill Fogarty

IS THERE improvement in the operation of dealers' service shops around the country? Over a seven-year span, dealers as a whole have cut their dollar losses in the shop, but movement has been modest and glacial.

What do we say about a dealer fraternity that no longer loses over $60,000 a year on average back in the shop—only a little less than $50,000:

Think about it: We've been living through an era like nothing since World War II. It has been a time in which farmers have depended on dealers to keep an aging, worn machinery fleet going in order to survive. The profit opportunities have been clear.

It has also been a time in which dealers have hunted for all kinds of diversified product lines—not all of them suitable—to provide some income and keep the doors open. And service has remained neglected.

Yes, some of these doors have closed anyway. *I&T* has often suggested that if dealers and their suppliers recognized the need for profitability in the shop, and had accepted profitability as the indispensible standard, many of those doors would still be open.

When we've been on our soapbox about this, we've sometimes been told: Relax. If dealers accounted properly in the shop and took steps to end the unprofitability, they would only be transferring the losses to the sales department.

Wrong! First of all, there are many dealers around who are proof that shop profitability *generates* profitability in other depart-

(More, pg. 12)

Service *(from page 10)*

ments. Second, once profitability is achieved in the shop, it generates greater excellence, more customer satisfaction, a quality reputation. You know what that means? It means that manufacturers' product lines derive a quality image. It means that more dealers stay in business and less money is wasted in the constant search for dealer replacements. What a pity that so many marketing bigshots in this industry are so hounded by their top managements to produce results *today* that they can't see the rewards of this long-range approach.

Reviewing data

Dealers have increased their sales of service labor in the 1980s. The national average per dealer moved from $162,327 in 1981 to $186,524 last year. This 15 percent increase was largely a result of dealers increasing their hourly labor rates. They didn't sell more of the hours they had available; they sold fewer.

In the 1980s, service labor has become a bigger slice of the dealership's overall volume, moving from 6.55 percent of all sales to 8.0 percent. Gross margin dollars increased by a third. In the first five years of our seven-year study, dealers improved service labor sales margins from 38 percent to 45 percent. The margins have eased off since then.

Dealers have held the line on dollars spent for shop supplies and expenses. Despite inflation, the average figure has stayed at a little over $10,000.

Similarly, the number of service technicians has stayed about the same. It would be encouraging to think that the 5.5 per shop has held steady because they are performing better. Undoubtedly many of them are, but look at billing efficiency (small table). Fewer of their total hours on the payroll are being charged out than at any time in the seven-year period: 62 percent.

The rise in sales per technician is a factor of the steady increase in the customer service rate. Over the seven years, the rate is up 30 percent. Hourly pay scales of top technicians and regular technicians have gone up 21 and 18 percent respectively.

Until 1985, the NFPEDA's *Cost of Doing Business* study included the hourly internal service rate. It isn't shown anymore. In the opinion of Texas A&M's Dick Edwards, who compiled the billing efficiency and shop loss data in the small table, this is because few dealers continue to maintain a separate, lower rate for internal labor than for customer work. If that is correct, it may be the brightest news in this article. It would signify that more dealers are understanding that overhead, wages and other costs continue at the same rate, whether work is being done on a customer's machine, a trade-in or anything else.

Question: How long will the market accept increases in the customer service labor rate? It is probably true that service labor rates in the farm equipment industry have generally been underpriced. A look at the rates charged by auto and truck dealerships would underscore this. In comparison, the service labor rates charged by the people who fix your photocopier, or even your neighborhood plumber, are astonishing.

Nevertheless, no price can continue to be raised indefinitely. Some form of price resistance will develop eventually. The question is raised to suggest that price hikes won't always avail as a substitute for inefficient shop man-

(See Service, page 36)

Bottom Line for Service Departments

The major factors in the service department picture are, did it make or lose money, and how much, and how well did the department perform its job of selling the service hours it bought? Here's a seven year look at billing efficiency and departmental loss, as compiled by Richard Edwards, agricultural economist at Texas A&M University.

Year	Billing Efficiency	Departmental Losses
1981	66 pct.	$67,000
1982	66 pct.	62,000
1983	63 pct.	47,000
1984	68 pct.	65,000
1985	64 pct.	52,000
1986	65 pct.	47,000
1987	62 pct.	47,000

Service Department Performance, 1981-87

	1981	1982	1983	1984	1985	1986	1987
Labor Sales	$162,327	$157,181	$153,739	$174,185	$174,580	$178,382	$186,524
Pct. of All Sales	6.55	7.18	7.19	6.98	7.81	8.00	8.00
Gross Margin	$61,096	$61,707	$64,605	$74,304	$78,818	$78,653	$81,559
Pct. of Labor Sales	37.64	39.25	42.02	42.66	45.15	44.09	43.73
Shop Supplies, Expenses	$10,413	$9,815	$9,322	$10,518	$9,861	$10,110	$10,105
No. of Technicians	5.85	5.50	5.39	5.38	5.40	5.30	5.50
Sales per Technician	$27,748	$28,579	$28,523	$32,310	$32,329	$33,656	$33.913
Wage, Top Technician	$7.52	$7.52	$7.73	$8.03	$8.17	$8.65	$9.07
Wage, Regular Technician	$6.05	$5.96	$6.02	$6.28	$6.44	$6.95	$7.13
Hourly Customer Service Rate	$19.55	$20.25	$21.24	$22.35	$23.55	$24.42	$25.46
Hourly Internal Service Rate	$17.04	$17.87	$17.42	$18.50			

Are Dealers' Parts De

By Bill Fogarty

IT'S TIME to take a long look at where we've been in the area of parts department performance. It might tell us where we're going and, if necessary, indicate where some changes in direction are important.

For starters, *I&T* took the newly issued *Cost of Doing Business* study issued by the National Farm & Power Equipment Dealers Assn. It covered dealer experience for 1987, and we noted all national average data for agricultural dealers' parts operations. Then we pulled the same CDB studies for the previous six years and entered the same numbers. What we got is what you see in the table that accompanies this report.

It would be ideal if the CDB could get input from all NFPEDA members so that comparability could be total from year to year. But some dealerships go out of business and new ones start up. And some dealerships deviate from standard practice in recording their data.

Nevertheless, NFPEDA gets a very strong sampling, for about one dealership in eight participates in the study. In effect, it's the only game in town, the best publicly available road map to show how the retail end of this business is doing.

The year-to-year numbers in the table can speak for themselves, but the following is commentary from a veteran industry watcher.

A seven-year examination of performance data shows some, not much improvement, with declines in the critical area of gross margins. Note to industrial dealers: You do better, but not a lot.

Parts sales, percent of total sales. Dealers' parts volume was a fourth more in 1987 than it was in 1981. Good? One would have to look at the true inflation record as applied to parts in this business to be sure, but it appears that volume has suffered at the hands of outside competition.

Stuart MacKay, the aftermarket research specialist used by the Farm & Industrial Equipment Institute, has said that farm equipment dealers had 69 percent of the parts aftermarket in 1980 and were getting only 59 percent in 1985.

Meanwhile, farmers were investing in parts at advanced rates to keep their older machines going. Sales of whole goods were declining in the 1980s, and thus, parts sales as a percent of total sales of the dealership went up. In 1981, they were 18 percent of the total; in 1986 and 1987, they were almost 24 percent.

Gross margins, margins as a percent of parts sales. Again, the dollars went up over the seven years. But the margins as a percent of sales continued downward. I&T had an article in 1981 which reviewed this trend. The decline was going on in parts department margins in the latter half of the 1970s: 32.23 percent in 1976, 29.62 percent in 1977, 29.13 percent in 1978, 28.62 percent in 1979, and 30.80 percent in 1980.

This trend line has wavered from its downward path somewhat over the dozen years, but the direction is clear.

Meanwhile, what has happened to the expenses that dealers must pay from these margin dollars? They have been going up—social security and hospitalization costs are the most notable ones, and there are others.

Parts inventory, parts as a percent of assets. The average ag dealership's parts inventory went up 28 percent over the seven years. Parts as a percent of assets has gone up by 35 percent over the same period.

AG DEALERS' PARTS PERFORMANCE : A SEVEN-YEAR

Year	Parts Sales	Pct. of Total Sales	Gross Margin	Pct. of Parts Sales	Parts Inventory	Parts as Pct. of Assets	Parts Turnover
1981	$450,017	18.13	$138.072	30.68	$167,351	11.37	**1.90**
1982	457,045	20.87	142,989	31.29	170,675	11.36	**1.81**
1983	450,964	21.09	139,807	31.00	173,744	11.72	**1.81**
1984	505,557	20.26	153,134	30.29	196,987	10.42	**1.78**
1985	526,836	23.58	156,094	29.63	198,261	12.62	**1.87**
1986	533,671	23.93	153,816	28.82	203,506	14.38	**1.87**
1987	556,067	23.85	156,869	28.21	213,738	15.27	**1.87**

partments Improving?

A good question: How diligent are dealerships in writing up or down the value of their assets as they change? Given the slow turnover rates (more about that later) that dealers traditionally produce, price hikes would have raised the value of that parts inventory somewhat more than these numbers are showing.

On the other hand, the FIEI Parts Committee reports that most of its members think that their dealers are gradually cutting down on their parts inventories, relying more on electronic inventory control systems to weed out slow moving items and tie up fewer dollars in parts.

Parts turnover. But if dealers are weeding out the slow movers, what's happening to turnover? Or rather, what *isn't* happening to turnover?

Turnover ratios started moving down in the mid-1970s from the unusual highs of 1973 and 1974: 2.24 in 1976, 2.02 in 1977, 2.05 in 1978, 2.01 in 1979 and 1.84 in 1980. Since then, they have generally hovered between 1.80 and 1.90.

Partsmen, performance and pay. Sales per partsman have moved up over the seven years by 26 percent. The salaries of partsmen have gone up by less than 20 percent. And that includes increases in payroll taxes and insurance. Does this mean that the margin squeeze that dealerships have felt in their parts departments has been coming out of the hides of the people who work in them? It's hard to come up with any other answer.

One is reminded of the comment of John Walker, the parts consultant: "Some dealerships' parts managers have incomes that could qualify them for food stamps."

SCORECARD

No. of Partsmen	Sales per Partsman	Partsmens' Salaries
2.14	$210,289	$32,103
1.97	232,003	31,757
2.07	223,250	31,391
2.06	245,166	35,514
2.10	251,158	35,345
2.10	254,129	37,487
2.10	264,793	38,419

Industrial dealers

In recent years, the *Cost of Doing Business* study has broken out information on industrial dealers. Without constructing a seven-year table, it might be good to see how ag and industrial dealerships currently compare:

Parts Factor, 1987	Industrial Dealers	Agricultural Dealers
Parts sales	$630,789	$556,067
Parts as pct. of sales	19.08	23.85
Gross margin	190,323	156,869
Pct. of parts sales	30.17	28.21
Parts inventory	190,848	213,738
Parts as pct. of assets	9.78	15.37
Parts turnover, times	2.31	1.87
Employees in parts dept.	2.60	2.10
Sales per parts employee	242,611	264,793
Parts employees' salaries	52,483	38,419

Clearly, industrial dealers have some natural advantages. They tend to develop higher overall volumes of sales, and their parts sales are thus substantially higher. Parts represent a substantially smaller amount of the industrial dealer's assets, and apparently he understands how to use those assets better, turning them at a much stronger rate than the ag dealer does.

But it is said that the industrial dealer's parts demand is much easier to anticipate and easier to stock for. Is it? Or do they simply use their parts information and control systems better?

The industrial dealer uses more personnel to get his better turnover and margin, and he pays his parts people just a shade better than the ag dealer does. When one compares typical urban vs. small town living costs, the ag dealer probably provides a better overall living for his parts people. The ag dealership parts personnel respond by making more sales per employee.

Given the varying circumstances between ag and industrial dealers, the edge goes to the industrial types, but not by much.

Report card

In the early 1980s, Ed Walsh, the independent consultant on dealership management concerns, said that a parts department had to generate a gross margin of 34 percent in order to make a satisfactory profit contribution for the business. Asked about the same figure today, Walsh commented:

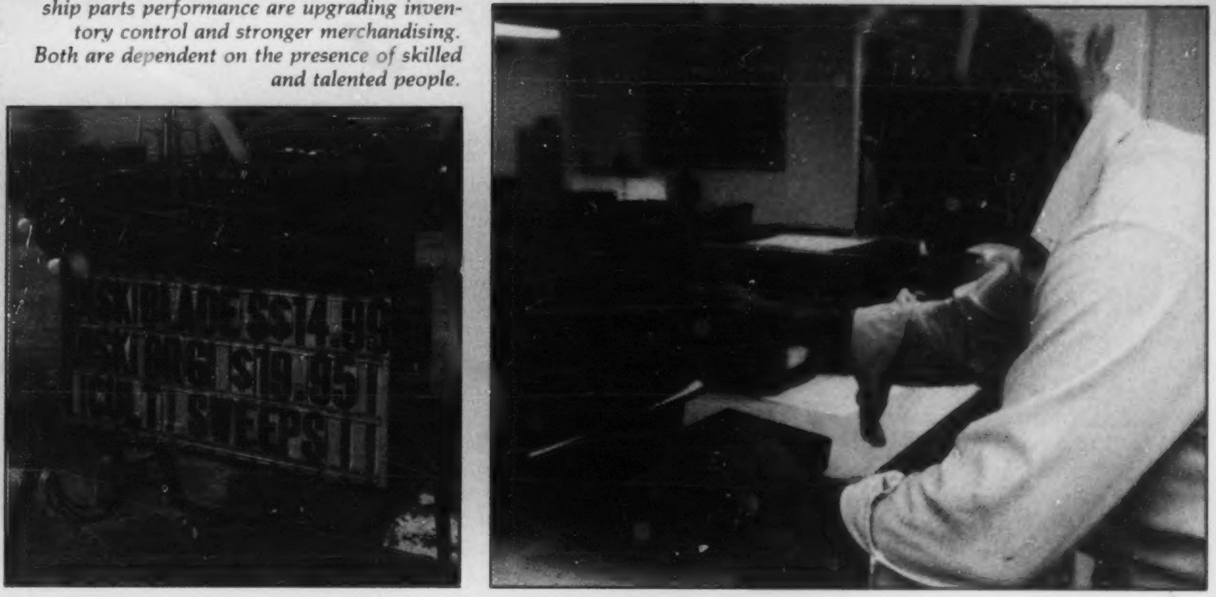
"I haven't put a pencil to it in the past couple of years, but if we assume that a dealership has the proper accounting procedures, an average rate of parts obsolescence, an acceptable level of parts receivables, etc., I'd stick with that 34 percent.

"Of course, if a dealership can get its sales per parts employee up, faster than inflation in parts prices, that would modify the gross margin percentage needed.

"It has been my experience that there is a tendency in many dealerships not to allocate what it really takes in the way of parts department overhead." In other words, the dealer gets a lower gross margin in parts, but because the department isn't being allocated its overhead

(More, next page)

THE TWO KEYS to improvement of dealership parts performance are upgrading inventory control and stronger merchandising. Both are dependent on the presence of skilled and talented people.



PARTS *(from pg. 23)*

properly, he thinks its profit contribution is satisfactory.

Walsh observed: "The biggest problem with the parts department is that it's not much different from the way it was 50 years ago. Parts come in and are unloaded and put away by hand. When they're sold, they come out by hand. You can't automate it. It's a hands-and-feet operation. And so dealers need to start using their brains."

Have they? In many dealerships, a lot of data-managing work that is a vital segment of the parts operation is now computerized. Done right, this can add to the productivity of the department and its personnel. But many parts experts fault dealers for not looking after all the profit possibilities that the department presents.

One of these is taking advantage of the parts return priviledge. Another is consistent merchandising efforts. Another is upgrading of parts personnel who are trained to sell.

As long as managements at many farm equipment dealerships are not inclined to give the parts department its due share of commitment, it isn't likely that *Cost of Doing Business* data will show much change. But the fact is, there are dealerships that know how to do it—and do it.

Meanwhile, there's that competition lurking out there that has been taking large chunks of the farm equipment parts business away from dealerships. They have nothing to do except sell parts efficiently and profitably. That's what totally occupies the minds of the people who run such outlets and the companies that supply them.

The fact that the CDB scorecard on parts department performance has changed little in the 1980s has to be examined in the light of this kind of formidable competition. ☐

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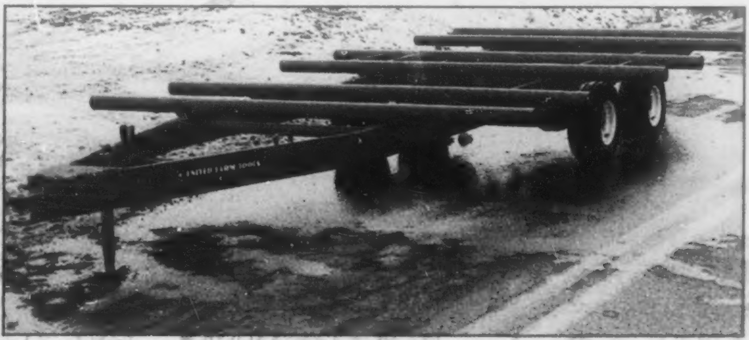

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FAX *(from page 14)*

chine, your only additional expense for using it is the cost of a long distance telephone call. If you have a one minute minimum line charge of 41 cents for the first minute and 35 cents for each additional minute, you can send a page (about 200 typewritten words) for 41 cents. Two pages will also go for 41 cents. You can send 10 pages for $1.46 and 25 pages for $3.21. You will normally use your regular telephone line, but it you can expect to be using the machine quite frequently during the day, you may wish to have a special "dedicated" line for it alone.

Supplier use

A number of your suppliers and wholesalers are making good use of facsimile machines themselves. For instance, Jay Hesse of Automatic Equipment Co., Pender, Neb., says: "We currently use our machine to correspond with all WDA distributors in the recreational vehicle field as well as many of our suppliers. We also know that Harco Ag of Harriston, Ont., communicates with us almost entirely by facsimile.

"We see many opportunities for the fax machine. Included are elimination of voice telephone time, manpower and customer hold time. We have found that most orders can be placed by facsimile, both wholegoods and parts. Quotations, availability and delivery time can also be communicated quickly and clearly in written form."

"With all the growth we've had around here," adds Hesse, "we're understaffed for people who take and give information over the phone. The fax cuts down on the time involved. We also find it useful in communicating with our ad agency when we want to make fast changes in the wording of our ads. We do in a day what took a week or so. We can also ask for and get steel bids from several suppliers immediately."

Available facsimile machines range in size from floor models down to units that can be carried on the road in a briefcase-size carrier. Telephone Yellow Pages list the many facsimile suppliers you can contact for specifications and prices. They have been known to make some especially good deals. NFPEDA is also considering plans which would allow dealers to obtain facsimile machines through its dealer services section.

So there you have it—a brief overview of what a facsimile machine can do for you, how much it will cost and how much you can expect to pay to operate it. One dealer, Woody McCartney, Durand, Ill., says:

"We could conceivably use such machines to send copy between our two stores which are located about 50 miles apart, but they will have to get the price down a bit before we can justify buying two of the units—one for each store. We've looked into the advantages and disadvantages of facsimile and have elected to wait for prices to get down to where we can justify their installation and use." ☐

Notebook *(from page 7)*

ter job, doesn't it?)

A lot of farm shows are put on by regional dealer associations or in affiliation with them. And because dealers are generally very loyal to their associations, many of them help out in the promoting of the shows. But they may soon learn that they have a much bigger stake in getting busloads of qualified people together for the trip to the regional show.

They will want some training from their suppliers in the fine art of getting the right people to the right show in large numbers. How else will they get customers to see, touch and be excited by the new machinery? Well, there are pictures in catalogs and literature on the racks, but they can only go so far. Or they buy and stock the inventory themselves. Rather expensive.

Meanwhile, we applaud the efforts of the North American Farm Show Council to work with the FIEI and FEMA in taking the whole trade show business closer to its necessary potential. It's only the beginning. ☐

Briefly...

Michael O'Brien, professor emeritus at the Department of Agricultural Engineering, University of California, Davis, has received the 1988 Massey-Ferguson medal from the American Society of Agricultural Engineers. It was given for his "dedication to effective teaching, interest in students and contributions to the knowledge base for agricultural engineering."

Service *(from page 12)*

agement. They don't suffice now: Look at the average shop loss of $47,000.

Some big winners

The *Cost of Doing Business* study draws participation from a broad spectrum of dealers. It's clear from an examination of the service department data of the high-profit ag dealers that some participants can and do make good money from a thriving service department that gives constant customer satisfaction.

Perhaps, rather than express frustration at what is happening in a large number of dealerships, we should focus on what's happening with the winners. When we do case histories of individual establishments, we do. However, the weak performance of the majority of shops is bad for the industry as a whole, not just these individuals.

As said earlier in this piece, when an unprofitable shop sucks another dealership under, everybody loses—the dealer who had wanted to build a successful business, the farmer who needs ready access to parts and service, and the manufacturer who now has no representation in the area and whose product value perception is dimmed a bit.

If that sounds alarmist, consider this: The general reputation of farm equipment dealerships as good places for service technicians to make a career is not strong. Dealers have trouble finding good technical talent. Vocational training programs in agricultural mechanics are said to be in trouble for lack of applicants.

As long as a large body of farm equipment dealers is disinclined to manage the service department to a point of profitability, they won't be attracting the talent they need to do the job in the 1990s. Given this situation, what will manufacturers do? Answers to such a question are many, and most of them wouldn't be very desirable to anyone involved—farmer, dealer or manufacturer. ☐

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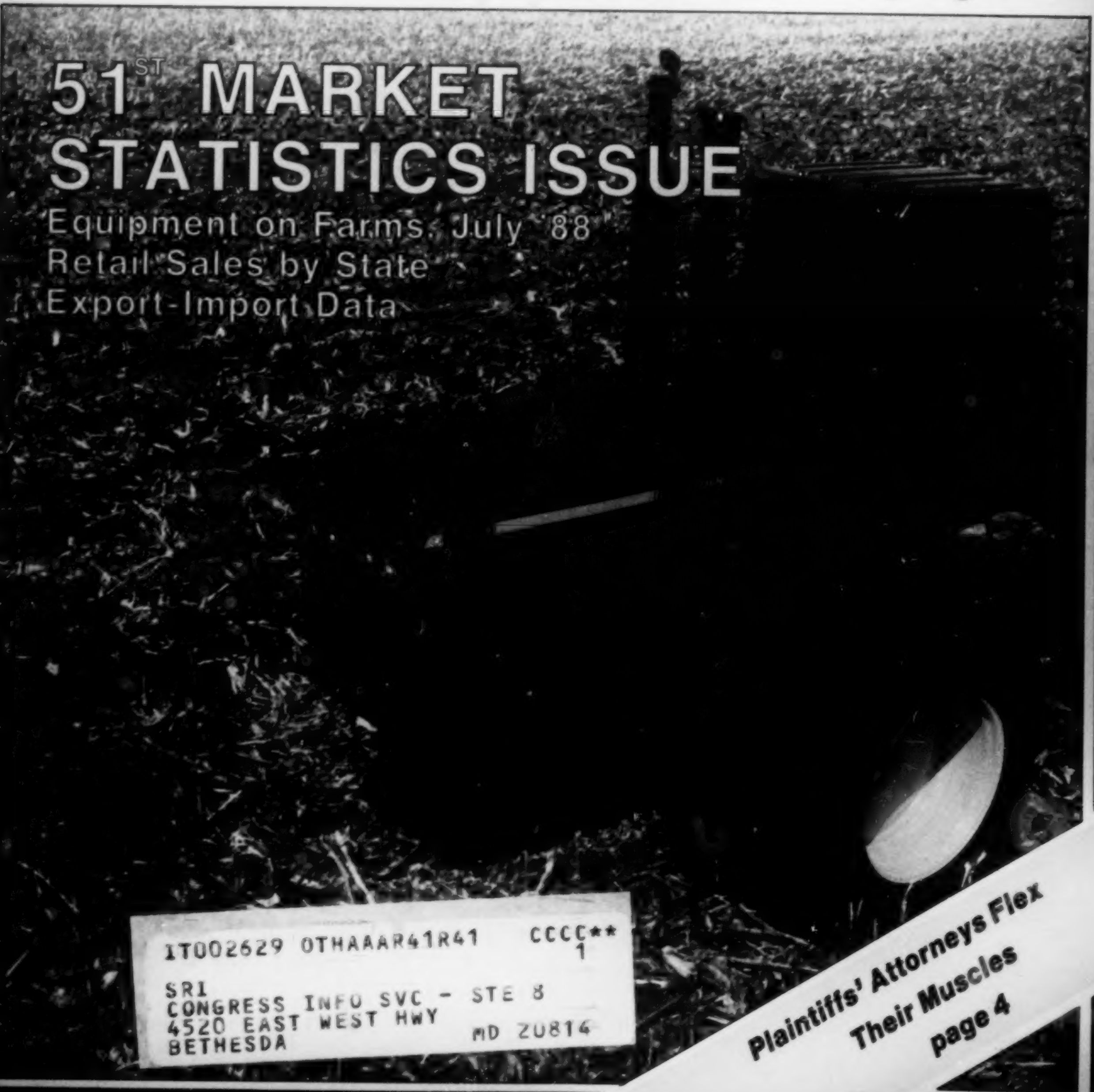
I&T 100 YEARS OF LEADERSHIP

Implement &Tractor

The business magazine of the farm and industrial equipment industry
October 1988

MARKETERS' SOUL SEARCH page 18



51ST MARKET STATISTICS ISSUE

Equipment on Farms, July '88
Retail Sales by State
Export-Import Data

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SRI
CONGRESS INFO SVC - STE 8
4520 EAST WEST HWY
BETHESDA MD 20814

Plaintiffs' Attorneys Flex Their Muscles
page 4

I&T 100 YEARS OF LEADERSHIP

Implement &Tractor

The business magazine of the farm and industrial equipment industry.

October 1988 • Vol. 103 • No. 11

On Our Cover

Implement & Tractor presents its 51st Market Statistics Issue—equipment inventories by state and type of product; retail sales by state; and import and export figures.

5-15

Features

18: **FIEI Old Fashion** Sales & Marketing Meeting in Chicago drew a large number of participants from the industry. The meeting was the result of survey last year which showed a sense of confusion as to the basics of marketing equipment to farmers.

24: **Old name:** National Farm & Power Equipment Dealers Assn. New name: North American Equipment Dealers Assn. And a long debate ends. J.A. Wilson is the new president.

27: **A dealer writes** about getting back on the right track after the termination of his dealership.

28: **Deere & Co.** introduced its 60 series four-wheel-drive tractors to its dealers at Denver. The company has its work cut out for it if it is to increase its share of the market.

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Farm Press
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Motor Vehicles and Specified Machines on U.S. Farms and Average Prices of Wheel Tractors, January 1, Designated Years[1]

YEAR	TRACTORS (exclusive of steam & garden)[2] Thousands	MOTOR TRUCKS Thousands	GRAIN COMBINES Thousands	CORN PICKERS and PICKER SHELLERS Thousands	PICK-UP BALERS Thousands	FIELD FORAGE HARVESTERS Thousands	GARDEN TRACTORS and MOTOR TILLERS[3] Thousands	WHEEL TRACTORS WHOLESALE PRICES[4] Per Unit Dollars	WHEEL TRACTORS WHOLESALE PRICES[4] Horsepower Dollars
1965	4,787	3,030	910	690	751	316	699	$ 3,541	$ 56
1966	4,783	3,017	888	686	752	316	725	$ 3,886	$ 58
1967	4,786	3,009	867	680	748	319	750	$ 4,257	$ 62
1968	4,766	3,016	847	673	739	321	770	$ 4,709	$ 66
1969	4,712	3,004	820	657	725	314	790	$ 4,976	$ 71
1970	4,619	2,978	790	635	708	304	805	$ 5,560	$ 76
1971	4,562	2,985	760	629	698	309	815	$ [illegible]90	$ 80
1972	4,509	2,993	725	625	687	315	825	$ [illegible],486	$ 84
1973	4,477	3,006	703	618	680	324	835	$ 6,953	$ 85
1974	4,478	3,020	685	618 ✓	677	332	850	$ 7,294	$ 86
1975	4,463	3,032	666	615	666	337	870	$ 8,459	$ 91
1976	4,434	3,043	647	610	642	342	890	$11,220	$112
1977	4,381	3,052	630	605	614	346	905	$12,692	$124
1978	4,350	3,054	615	600	595	345	917	$13,431	$144
1979	4,623	3,350	655	596	744	295	927	$16,512	$149
1980	4,598	3,367	653	592	759	293	933	$18,139	$166
1981	4,573	3,385	650	587	774	291	938	$23,308	$199
1982	4,547	3,405	647	582	788	288	942	$25,941	$204
1983	4,520	3,427	644	576	799	285	944	$34,198	$237
1984	4,497	3,449	642	569	810	282	945	$37,434	$261
1985	4,480	3,467	640	561	822	280	942	$40,730	$290
1986	4,465	3,460	637	552	819	278	938	....	....
1987	4,443	3,446	632	540	812	273	933	....	....
1988	4,430	3,432	629	531	801	270	930	....	....

[1] SOURCE: Reports of the USDA and the Bureau of the Census. On-farm data after 1970, except 1975 and 1979, are estimated by I&T.

[2] Consists of Wheel and Crawler Tractors.

[3] Motor Tillers included after 1964.

[4] Estimated at wholesale level by dividing Value of Manufacturers' Shipments by Units Shipped and by Maximum Belt Horsepower, data are published in "Current Industrial Reports" of the Bureau of the Census. Not available after 1985.

Note: Data from the 1978 Census (Jan. 1, 1979 above) and later years, reflect changes in sample coverage and are not fully comparable with earlier years.

thought. Forage choppers sell with metal detection devices that shut them down, but there's no such shutoff for (people). No salesman has ever tried to sell me on a safety feature, and I own 25 pieces of machinery, each one of which can kill and maim.

"There are contributory causes of accidents such as the ages of operators — some are kids, some lack experience, some are old or in poor physical condition. Why is that so?"

He offered his own answer: "It's a matter of tradition and economic necessity. My kids are 10 and 11 and they drive my pickup truck. I'll be teaching them to drive tractors (soon). We also have to hire young kids to do farm work — 15 years old or so.

"My dad has slowed down and has no business on a tractor. He can't handle the long hours, but he's doing it because he wants to and because I need him. I'm the exploiter, and I work 60 hours a week, 80 in season. Sometimes we have to run day and night, and it's fatiguing. My newest tractor is a 1975 model and I have a 10-year-old combine. I have neighbors who have 40-hour jobs off the farm and then work all night and weekends....

"Meanwhile, the government gives exemptions (regarding safety regulations to farmers) that cost us arms and legs.

"We have to make farming economically feasible. We don't want to maim ourselves. But unless it's possible to make a living (in agriculture), the accidents will continue. We have to take the risks or lose our homes, our jobs, our farms."

Russ Hahn of ASAE outlined the function of his organization in forming voluntary safety standards for the industry. And he may have deflated part of the excitement of the meeting for some by pointing out National Safety Council data showing a decline in the death rate for agriculture, from 1986 to 1987, of 6 percent. He also disagreed with Libbra's assertion that safety is an afterthought.

"Work on ROPS, for example, began back in the 1960s, before our society became as litigious as it is today."

Carlton Zink, whose engineering career goes back to the 1920s, also spoke of efforts to improve farm equipment safety over decades, as well a farmers' general disinterest in ROPS and shielding for the pto. He described how today's slow-moving-vehicle emblem standard evolved from early efforts of the FIEI Safety Committee.

Arnold Skromme opened his remarks by telling the trial lawyers he was going to change their minds.

"Agricultural engineers are being blamed (for the bad accident/injury record), and we shouldn't be. We have developed good, even great standards.

"But farmers don't want safe machines. We need retrofits, but it isn't happening. Why doesn't the Occupational Safety & Health Administration do something? Because Congress tells it to keep its hands off of agriculture. Farmers and their political organizations don't want inspectors on their farms. And the shields we developed are thrown away."

Skromme made this suggestion: The government has a history of putting strings on the money it gives away. And we know that if more tractors had ROPS, we could cut the death rate from rollovers. Why can't

(MORE, next page)

Principal Machines on Farms — 1988

STATE	MOTOR TRUCKS			INTERNAL COMBUSTION ENGINES[1]	CHAIN SAWS
	1978 Census Thousands	1982 Census Thousands	Estimated July 1, 1988 Thousands	Estimated July 1, 1988 Number	Estimated July 1, 1988 Number
Maine	12.3	12.2	11.9	1,300	7,170
New Hampshire	3.8	4.1	4.1	1,220	2,370
Vermont	6.6	7.5	7.8	1,700	5,960
Massachusetts	9.0	9.4	9.4	1,760	4,345
Rhode Island	1.3	1.3	1.3	185	605
Connecticut	6.6	6.8	6.6	1,545	3,640
New York	57.6	60.5	61.4	48,150	48,580
New Jersey	14.4	15.2	15.4	2,260	5,730
Pennsylvania	63.8	66.1	66.3	19,500	42,190
Delaware	6.2	6.2	6.1	910	2,430
Maryland	22.8	25.9	27.1	4,410	11,750
NORTHEAST	204.4	215.2	217.4	55,290	134,340
Ohio	107.1	107.8	106.7	18,670	58,470
Indiana	114.4	112.2	110.4	19,310	62,530
Illinois	150.6	150.6	148.1	28,740	68,000
Iowa	144.0	147.7	147.1	30,600	54,050
Missouri	155.9	159.7	160.3	31,600	90,550
CORN BELT	672.0	678.0	672.6	128,920	333,600
Michigan	77.4	80.3	80.7	17,380	43,750
Wisconsin	98.0	99.5	98.6	33,310	88,790
Minnesota	144.1	143.8	141.1	45,210	63,490
LAKE STATES	319.5	323.6	320.4	95,900	196,030
North Dakota	107.7	101.1	95.7	34,070	4,100
South Dakota	66.0	68.0	67.9	22,600	3,160
Nebraska	118.6	118.9	117.3	30,900	13,500
Kansas	160.8	159.4	155.9	39,830	22,270
GREAT PLAINS	453.1	447.4	436.8	127,400	43,030
West Virginia	19.2	20.5	20.7	4,840	20,850
Kentucky	119.3	125.2	127.1	15,560	42,770
Tennessee	96.4	104.7	108.1	11,990	56,700
Virginia	62.6	68.0	69.5	11,600	46,400
North Carolina	106.2	103.3	99.7	15,100	83,550
APPALACHIAN	403.7	421[illegible]	425.1	59,090	250,270
South Carolina	36.1	34.6	33.1	5,950	23,600
Georgia	74.3	72.6	70.5	12,260	32,550
Florida	49.4	51.2	51.3	11,710	7,460
Alabama	68.6	67.4	65.7	9,970	30,740
SOUTHEAST	228.4	225.8	220.6	38,890	94,350
Mississippi	58.0	59.0	58.6	9,600	36,290
Louisiana	44.9	44.3	43.5	11,430	19,910
Arkansas	80.7	79.3	77.2	12,950	30,580
DELTA STATES	183.6	182.6	179.3	33,980	86,780
Oklahoma	118.3	122.8	124.4	19,400	9,860
Texas	239.0	249.9	262.4	57,900	19,270
SOUTHERN PLAINS	357.3	372.7	386.8	77,300	29,130
Montana	67.2	68.2	67.7	17,660	11,740
Idaho	56.7	57.1	56.2	14,460	13,110
Wyoming	20.0	22.1	22.9	5,720	3,180
Colorado	63.4	63.0	61.7	18,580	6,020
New Mexico	23.9	24.6	24.6	6,950	2,985
Arizona	15.3	16.6	17.0	4,760	510
Utah	21.7	23.3	23.8	6,030	2,350
Nevada	6.0	6.5	6.5	1,410	600
MOUNTAIN STATES	274.2	281.4	280.4	75,570	40,495
Washington	64.7	69.2	70.0	15,100	22,600
Oregon	54.4	61.2	58.3	19,580	25,660
California	134.6	147.9	152.7	58,660	31,750
PACIFIC	253.7	278.3	281.0	93,340	80,010
TOTAL	3,349.9	3,426.7	3,440.0	820,000	1,300,000

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[1] Includes engines used for stationary work such as irrigation, auxilliary engines on combines, balers, etc., and a small number of power units not elsewhere classified.

NOTEBOOK *(from pg. 5)*

the government insist that a farmer sign a statement to the effect that all the tractors he's using have ROPS if he wants his government check? Skromme said that he got nowhere with this suggestion when it was offered to the government. He was told, he said, that the Farm Bureau resists the idea of any such government interference with the farmer's independence.

If Skromme moved some of the lawyers present toward a shift of mind about engineers, the next speaker was clearly unimpressed. Attorney Habush said:

"Many of the injuries and deaths are preventable by exercise of common sense by manufacturers. Improvements have been too little and too late, and these engineers *(gesturing to the engineer panelists beside him)* are the proof.

"Farmers are the most non-litigious people I've ever met. It has been said that farmers don't want regulation. Maybe they don't want inspectors on their farms, but they do want safety. They do want inspection and thought in engineering departments and the offices of chief executives. The claim that 'the government didn't make us' (apply various safety devices) is a bit disingenuous. The law requires manufacturers to act prudently, to design out hazards that can be designed out and warn of those that can't.

"I suggest to farm equipment manufacturers that the age (of equipment operators), the night work, the other hazards — all these can be perceived. They're all foreseeable and can be considered in the design of a machine. They know that kids and illiterates use their machines and that there's no OSHA inspector. They've know all this for decades, but hazards are not shielded like machines in factories. There are no programs of recall and few retrofits....

"My bias is obvious. My cynicism is apparent. The most neglected area of safety improvement has been farms, and the recent attention to safer design has been caused by the greatest regulator, the American jury."

Whew! Then keynoter Jim Hightower arrived late, toting, I kid you not, a white cowboy hat. He said:

"We're beginning to build an alli-

(MORE, page 10)

Principal Machines on Farms — 1988

STATE	WHEEL TRACTORS 1978 Census Number	WHEEL TRACTORS 1982 Census Number	WHEEL TRACTORS Estimated July 1, 1988 Number	SELF-PROPELLED COMBINES 1978 Census Number	SELF-PROPELLED COMBINES 1982 Census Number	SELF-PROPELLED COMBINES Estimated July 1, 1988 Number	CORN HEADS 1978 Census Number	CORN HEADS 1982 Census Number	CORN HEADS Estimate July 1, 1988 Number
Maine	13,741	13,569	13,265	388	320	268	183	181	170
New Hampshire	4,877	5,097	5,140	14	8	4	64	50	40
Vermont	14,637	15,274	15,360	156	76	60	346	374	365
Massachusetts	9,840	9,956	9,860	26	23	19	113	145	145
Rhode Island	1,462	1,364	1,280	13	6	4	17	13	10
Connecticut	7,865	8,421	8,560	86	53	40	157	98	70
New York	120,215	119,498	117,475	5,775	6,030	6,035	3,401	3,904	3,975
New Jersey	20,655	20,554	20,220	1,086	1,011	935	532	593	585
Pennsylvania	137,998	136,505	133,830	9,674	9,707	9,530	4,409	5,408	5,645
Delaware	8,348	8,012	7,840	1,314	1,342	1,335	1,003	1,006	960
Maryland	36,251	36,951	36,760	3,518	3,279	3,090	2,732	2,840	2,770
NORTHEAST	375,889	375,201	369,590	22,050	21,855	21,320	12,957	14,612	14,735
Ohio	198,865	193,367	187,795	33,449	33,200	32,440	24,438	26,403	26,265
Indiana	176,767	167,563	160,325	37,403	34,646	32,595	32,638	31,391	29,620
Illinois	277,604	262,112	254,000	63,230	61,411	59,440	55,793	55,636	53,250
Iowa	323,132	305,334	294,440	55,586	57,726	58,155	53,030	57,046	56,650
Missouri	198,225	193,758	189,560	33,378	32,957	32,110	23,056	21,834	20,290
CORN BELT	1,174,593	1,122,134	1,086,120	223,045	219,940	214,740	188,955	192,310	186,075
Michigan	148,063	146,655	144,390	18,919	21,060	21,405	11,076	13,583	14,375
Wisconsin	252,594	243,827	236,890	18,262	19,215	19,335	8,458	11,939	13,330
Minnesota	277,920	264,581	255,380	44,841	45,847	45,645	27,197	31,098	31,845
LAKE STATES	678,577	655,063	636,660	82,022	86,122	86,385	46,731	56,620	59,550
North Dakota	120,191	108,103	102,590	30,782	27,546	26,005	1,619	2,708	3,070
South Dakota	111,485	105,699	100,260	16,503	16,961	16,885	7,759	9,606	10,355
Nebraska	175,569	164,308	158,625	35,083	34,032	32,900	24,623	25,484	25,355
Kansas	157,327	149,870	144,870	47,142	46,662	45,560	9,150	8,321	7,295
GREAT PLAINS	564,572	527,980	506,345	129,510	125,201	121,350	43,151	48,119	46,075
West Virginia	24,901	27,110	27,680	479	562	610	265	471	495
Kentucky	157,432	163,176	162,800	10,568	11,466	11,755	8,382	9,924	10,295
Tennessee	120,161	126,365	128,675	10,765	11,227	11,265	5,581	6,508	6,715
Virginia	83,836	88,511	88,790	5,878	6,224	6,275	4,255	5,061	5,170
North Carolina	145,863	131,488	125,400	13,297	13,820	12,250	10,326	10,618	10,285
APPALACHIAN	532,193	536,650	533,345	40,987	42,299	42,155	28,809	32,582	32,960
South Carolina	47,967	44,338	41,460	6,420	6,263	6,025	3,854	3,808	3,635
Georgia	79,031	75,505	72,520	9,589	8,980	8,535	7,302	6,438	5,755
Florida	51,099	52,346	52,185	1,726	1,742	1,700	1,112	1,307	1,335
Alabama	69,438	66,330	63,590	6,660	6,935	6,965	3,383	3,630	3,590
SOUTHEAST	247,535	238,519	229,555	24,395	23,920	23,225	15,651	15,183	14,315
Mississippi	72,483	70,139	68,365	9,911	9,695	9,415	527	861	975
Louisiana	58,373	56,883	55,425	9,624	8,468	7,710	377	286	230
Arkansas	84,108	81,556	79,265	13,960	12,891	12,100	292	221	180
DELTA STATES	214,964	208,578	203,055	33,495	31,054	29,225	1,196	1,368	1,385
Oklahoma	99,771	99,934	98,715	17,647	17,299	16,785	822	600	475
Texas	262,886	264,740	262,805	23,026	21,049	19,535	3,628	3,913	3,890
SOUTHERN PLAINS	362,657	364,674	361,520	40,673	38,348	36,320	4,450	4,513	4,365
Montana	54,737	54,666	53,840	13,180	12,038	11,095	101	89	70
Idaho	53,552	50,575	48,510	9,843	9,309	8,835	414	344	315
Wyoming	19,322	20,673	20,985	1,999	1,991	1,945	171	221	235
Colorado	58,331	56,141	54,515	8,404	7,994	7,660	2,397	2,618	2,590
New Mexico	16,601	17,455	17,500	1,513	1,346	1,215	246	308	325
Arizona	11,956	12,262	12,205	509	369	280	60	94	90
Utah	21,145	21,613	21,475	1,743	1,591	1,455	186	225	230
Nevada	5,142	5,160	5,100	263	234	190	3	19	20
MOUNTAIN STATES	240,786	238,545	234,130	37,454	34,872	32,665	3,578	3,918	3,875
Washington	53,301	59,377	61,330	8,431	8,314	8,090	470	558	575
Oregon	48,158	53,243	55,030	6,335	6,235	6,055	*	209	205
California	129,480	139,735	144,055	6,270	6,102	5,885	1,016	1,123	1,120
PACIFIC	230,939	252,355	260,415	21,036	20,651	20,030	1,486	1,890	1,900
TOTAL	4,622,705	4,519,699	4,420,735	654,667	644,262	627,415	346,964	369,115	365,235

*Not reported separately

Principal Machines on Farms — 1988

STATE	POWER ELEVATORS Estimated July 1, 1988 Number	MANURE SPREADERS Estimated July 1, 1988 Number	CORN & COTTON PLANTERS Estimated July 1, 1988 Number	GRAIN DRILLS Estimated July 1, 1988 Number	MOLDBOARD PLOWS Estimated July 1, 1988 Number	SIDE DELIVERY RAKES Estimated July 1, 1988 Number	POWER TRACTOR MOWERS* Estimated July 1, 1988 Number
Maine	4,835	2,830	285	770	7,680	5,290	6,010
New Hampshire	2,280	1,810	255	50	2,625	2,240	2,745
Vermont	7,355	5,705	1,440	285	8,875	6,680	8,160
Massachusetts	3,300	2,060	790	100	5,310	3,180	3,600
Rhode Island	460	245	95	25	615	290	290
Connecticut	3,840	2,215	925	75	5,040	2,250	3,160
New York	63,995	36,450	17,720	24,290	70,270	43,345	50,220
New Jersey	5,635	2,180	2,165	2,225	14,640	3,630	4,150
Pennsylvania	68,175	37,710	30,530	36,455	89,260	44,700	55,860
Delaware	3,620	1,595	1,910	1,840	5,630	950	960
Maryland	15,035	7,595	7,790	8,035	25,250	8,130	10,310
NORTHEAST	178,530	100,395	63,905	74,150	235,195	120,685	145,285
Ohio	117,200	50,995	57,795	58,070	143,480	50,870	58,870
Indiana	116,325	45,095	59,265	47,305	122,530	37,540	46,030
Illinois	177,110	65,960	86,700	59,650	158,945	48,715	64,820
Iowa	187,050	90,020	96,410	55,335	189,380	82,340	97,810
Missouri	82,925	50,605	46,185	48,090	133,495	48,620	79,030
CORN BELT	680,610	302,675	346,355	268,450	747,830	268,085	346,560
Michigan	83,125	33,270	35,050	46,715	115,680	39,895	43,695
Wisconsin	131,130	76,395	61,800	59,550	148,180	83,415	94,500
Minnesota	146,870	69,110	74,395	69,050	159,825	80,670	87,960
LAKE STATES	361,125	178,775	171,245	175,315	423,685	203,980	226,155
North Dakota	71,175	18,805	13,865	54,650	58,620	21,040	37,175
South Dakota	63,210	26,275	28,055	30,950	58,820	21,420	43,410
Nebraska	97,950	40,260	41,895	39,665	83,485	32,540	50,215
Kansas	104,500	33,570	20,310	64,445	84,755	33,420	49,730
GREAT PLAINS	336,835	118,910	104,125	189,710	285,680	108,420	180,530
West Virginia	6,300	7,610	4,830	3,380	17,470	8,920	17,130
Kentucky	24,330	25,095	35,540	10,430	99,240	28,910	46,130
Tennessee	15,000	18,310	48,035	13,025	64,400	23,040	49,440
Virginia	18,530	19,585	23,920	15,715	59,800	21,960	30,170
North Carolina	20,300	19,175	67,465	21,060	57,450	15,000	30,660
APPALACHIAN	84,460	89,775	179,790	63,610	298,360	97,830	173,530
South Carolina	4,605	3,540	28,265	10,870	9,985	5,540	9,435
Georgia	13,775	6,000	35,930	9,375	28,385	9,980	15,720
Florida	3,650	1,080	5,510	1,625	18,400	1,810	3,590
Alabama	11,300	4,005	39,150	6,590	21,235	7,155	15,380
SOUTHEAST	33,330	14,625	108,855	28,460	78,005	24,485	44,125
Mississippi	7,730	4,570	48,620	7,755	26,820	9,180	20,345
Louisiana	2,525	2,635	16,400	6,940	20,065	5,930	10,265
Arkansas	9,435	6,430	20,210	12,385	44,340	9,900	19,660
DELTA STATES	19,690	13,635	85,230	27,080	91,225	25,010	50,270
Oklahoma	25,200	8,350	8,545	30,265	74,185	18,820	30,755
Texas	40,110	15,845	51,355	47,405	84,850	21,860	44,670
SOUTHERN PLAINS	65,310	24,195	59,900	77,670	159,035	40,680	75,425
Montana	28,030	9,840	1,015	20,470	26,355	13,230	20,350
Idaho	24,470	12,275	2,475	14,885	32,005	15,490	20,245
Wyoming	5,030	4,210	885	3,965	15,025	4,990	5,820
Colorado	25,200	12,525	5,780	14,790	25,160	13,620	14,930
New Mexico	2,575	2,040	2,940	1,870	8,415	4,020	4,470
Arizona	1,800	865	1,765	1,365	3,225	1,350	1,925
Utah	10,060	6,790	1,580	5,275	14,535	8,950	10,265
Nevada	940	995	60	305	2,445	1,430	1,480
MOUNTAIN STATES	98,105	49,540	16,500	62,925	127,165	63,080	79,485
Washington	21,750	12,945	1,705	16,550	35,535	13,040	19,660
Oregon	17,530	11,425	1,055	11,390	34,540	11,470	18,495
California	24,220	13,440	8,560	8,565	57,740	13,230	22,385
PACIFIC	63,500	37,810	11,320	36,505	127,815	37,740	60,540
TOTAL	1,921,495	930,335	1,147,225	1,003,875	2,573,995	989,995	1,381,905

*Cutter bar type only.

Principal Machines on Farms — 1988

STATE	PICK-UP BALERS			FIELD FORAGE HARVESTERS[1]			MOWER CONDITIONERS[2]		
	1978 Census Number	1982 Census Number	Estimated July 1, 1988 Number	1978 Census Number	1982 Census Number	Estimated July 1, 1988 Number	1978 Census Number	1982 Census Number	Estimated July 1, 1988 Number
Maine	2,609	3,047	3,140	1,309	1,181	1,085	2,023	2,353	2,535
New Hampshire	1,254	1,259	1,210	545	544	515	889	960	1,005
Vermont	4,082	4,167	4,065	2,707	2,569	2,365	3,777	3,866	3,900
Massachusetts	1,732	1,704	1,525	1,092	1,083	1,035	1,472	1,533	1,565
Rhode Island	181	205	200	113	93	75	124	146	155
Connecticut	1,509	1,508	1,455	804	773	720	1,063	1,318	1,475
New York	28,853	28,078	26,690	20,298	19,040	17,650	25,390	25,603	25,620
New Jersey	2,194	2,260	2,220	1,093	1,165	1,150	2,275	2,386	2,435
Pennsylvania	37,288	37,257	35,925	18,891	18,078	16,790	29,419	29,456	29,400
Delaware	568	531	495	269	249	220	587	519	475
Maryland	5,581	5,719	5,580	2,852	2,670	2,490	4,653	5,136	5,365
NORTHEAST	85,851	85,735	82,505	49,973	47,465	44,095	71,672	73,276	73,930
Ohio	38,496	39,754	38,960	11,209	11,090	10,595	26,997	26,143	25,760
Indiana	23,838	23,947	23,210	6,912	6,917	6,635	15,733	15,583	15,485
Illinois	30,632	30,463	29,340	11,557	9,972	8,825	21,173	21,867	22,265
Iowa	47,389	47,776	46,610	19,393	17,638	16,115	26,375	28,401	29,595
Missouri	43,981	48,662	48,875	8,704	8,055	7,380	23,469	26,527	28,150
CORN BELT	184,336	190,602	186,995	57,775	53,672	49,550	113,747	118,521	121,255
Michigan	24,536	25,051	24,530	12,704	11,809	10,840	20,696	21,055	21,325
Wisconsin	58,443	58,042	56,135	43,154	43,880	42,540	51,830	51,630	51,495
Minnesota	50,165	51,038	49,855	23,341	23,803	23,050	31,714	32,050	32,290
LAKE STATES	132,144	134,131	130,520	79,199	79,492	76,430	104,240	104.735	105,110
North Dakota	15,180	16,628	16,750	5,538	4,839	4,415	6,315	6,181	6,065
South Dakota	14,174	17,966	19,195	11,280	10,568	9,785	5,673	6,958	7,120
Nebraska	16,968	18,906	19,390	13,870	12,538	11,415	14,740	15,497	15,920
Kansas	29,222	31,998	32,405	10,778	9,367	8,305	17,144	18,932	19,710
GREAT PLAINS	75,544	85,498	87,740	41,466	37,312	33,920	43,872	47,568	48,815
West Virginia	9,119	10,550	10,920	2,094	2,323	2,320	5,035	6,033	6,515
Kentucky	31,575	35,143	36,015	7,752	7,910	7,680	23,656	23,8[illegible]	24,015
Tennessee	22,028	26,506	27,910	5,202	6,313	6,615	16,834	18,734	19,510
Virginia	17,932	21,805	22,625	6,075	6,209	5,995	12,404	14,659	15,920
North Carolina	12,461	12,752	12,290	4,204	3,502	2,970	10,577	10,888	10,945
APPALACHIAN	93,115	106,756	109,760	25,327	26,257	25,580	68,506	74,119	76,905
South Carolina	4,404	4,823	4,750	1,369	1,260	1,150	3,370	4,033	4,365
Georgia	8,671	10,407	10,870	2,652	2,717	2,635	9,176	9,465	9,550
Florida	2,787	3,754	4,095	903	861	805	6,406	7,591	8,260
Alabama	10,068	11,322	11,485	2,102	2,112	2,030	8,349	8,212	8,110
SOUTHEAST	25,930	30,306	31,200	7,026	6,950	6,620	27,301	29,301	30,285
Mississippi	8,286	10,509	11,235	2,003	1,927	1,820	7,294	7,949	8,270
Louisiana	5,666	6,425	6,580	1,299	1,327	1,280	6,587	6,698	6,740
Arkansas	10,783	13,994	15,215	1,882	1,634	1,435	8,366	10,035	10,905
DELTA STATES	24,735	30,928	33,030	5,184	4,888	4,535	22,247	24,682	25,915
Oklahoma	19,242	22,690	23,650	2,420	2,491	2,430	14,990	17,107	18,305
Texas	26,382	33,736	35,355	5,339	5,109	4,775	32,449	39,629	37,235
SOUTHERN PLAINS	45,624	56,426	59,005	7,759	7,600	7,205	47,439	56,736	55,540
Montana	11,692	12,468	12,465	2,086	2,429	2,490	7,304	8,102	8,450
Idaho	12,862	12,210	11,510	2,391	2,384	2,285	9,029	8,515	8,220
Wyoming	4,468	5,060	5,220	1,261	1,222	1,150	3,433	3,904	4,140
Colorado	10,374	10,365	9,990	4,355	3,503	2,975	7,259	7,040	6,920
New Mexico	3,252	3,403	3,380	774	802	785	2,317	2,395	2,440
Arizona	1,004	6,942	1,020	298	348	350	780	861	900
Utah	6,922	6,965	6,750	1,874	1,978	1,950	5,098	5,547	5,770
Nevada	1,470	1,598	1,595	353	437	460	1,245	1,314	1,355
MOUNTAIN STATES	52,044	53,117	51,930	13,392	13,103	12,445	36,465	37,678	38,195
Washington	8,717	9,518	9,555	2,890	3,060	3,020	8,107	9,838	10,745
Oregon	8,443	9,730	10,050	2,602	2,555	2,430	7,033	8,528	9,290
California	6,358	6,725	6,730	2,530	2,715	2,705	7,558	9,299	10,255
PACIFIC	23,518	25,973	26,335	8,022	8,330	8,155	22,698	27,665	30,290
TOTAL	743,841	799,472	799,020	295,123	285,069	268,535	558,187	594,281	606,240

[1] Shear-bar type. [2] Does not include windrowers with conditioning rolls.

Farm Wheel Tractor Retail Sales By State, 1984-1987

(In Units)

State	1984			1985			1986			1987		
	2-wheel Drive	4-wheel Drive	Total Tractors	2-wheel Drive	4-wheel Drive	Total Tractors	2-wheel Drive	4-wheel Drive	Total Tractors	2-wheel Drive	4-wheel Drive	Total Tractors
Alabama	2,653	10	2,663	2,872	2	2,874	3,041	—	3,041	2,943	1	2,944
Alaska	71	—	71	39	—	39	22	—	22	20	—	20
Arizona	782	30	812	1,240	29	1,269	657	16	673	638	2	640
Arkansas	3,714	91	3,805	3,683	70	3,753	3,154	55	3,209	3,083	31	3,114
California	5,946	186	6,132	4,931	74	5,005	5,138	73	5,211	4,970	49	5,019
Colorado	1,234	106	1,340	983	89	1,072	711	50	761	682	59	741
Connecticut	618	3	621	715	1	716	937	—	937	1,091	1	1,092
Delaware	248	7	255	286	7	293	351	6	357	320	4	324
Florida	4,614	19	4,633	4,543	30	4,573	4,732	31	4,763	4,375	55	4,430
Georgia	4,655	10	4,665	5,242	5	5,247	5,077	6	5,083	5,173	3	5,176
Hawaii	116	5	121	126	9	135	142	4	146	149	4	153
Idaho	1,062	117	1,179	786	83	869	483	35	518	497	17	514
Illinois	3,958	312	4,270	3,327	252	3,579	3,182	155	3,337	3,204	116	3,320
Indiana	2,801	135	2,936	2,789	113	2,902	2,784	68	2,852	2,712	46	2,758
Iowa	2,964	129	3,093	1,894	68	1,962	2,022	69	2,091	2,433	64	2,497
Kansas	2,199	342	2,541	1,739	248	1,987	1,585	134	1,719	1,591	132	1,723
Kentucky	2,945	15	2,960	3,044	23	3,067	2,643	11	2,654	2,519	8	2,527
Louisiana	3,894	48	3,942	3,419	66	3,485	2,602	15	2,617	2,430	23	2,453
Maine	615	—	615	625	—	625	806	—	806	824	—	824
Maryland	1,683	7	1,690	2,139	3	2,142	2,081	1	2,082	2,279	2	2,281
Massachusetts	621	—	621	783	—	783	999	—	999	1,188	—	1,188
Michigan	2,751	132	2,883	2,975	74	3,049	3,051	51	3,102	2,624	34	2,658
Minnesota	2,441	295	2,736	1,714	202	1,916	1,651	183	1,834	1,816	153	1,969
Mississippi	3,030	25	3,055	3,172	20	3,192	2,516	7	2,523	2,317	16	2,333
Missouri	3,036	75	3,111	3,159	35	3,194	3,290	38	3,328	3,266	43	3,309
Montana	677	195	872	602	122	724	323	103	476	340	76	416
Nebraska	1,598	99	1,697	963	63	1,026	1,258	66	1,324	1,314	64	1,378
Nevada	82	6	88	113	4	117	102	2	104	99	1	100
New Hampshire	712	1	713	946	—	946	1,139	—	1,139	1,293	—	1,293
New Jersey	1,039	1	1,040	1,062	1	1,063	1,275	—	1,275	1,337	—	1,337
New Mexico	371	19	390	529	18	547	418	9	427	444	5	449
New York	3,296	45	3,341	3,717	21	3,738	4,065	24	4,089	4,074	6	4,080
North Carolina	4,571	12	4,583	4,478	9	4,487	4,511	7	4,518	5,334	3	5,337
North Dakota	1,112	457	1,569	917	351	1,268	892	292	1,184	1,092	223	1,315
Ohio	3,887	108	3,995	4,537	56	4,593	4,364	67	4,431	4,276	25	4,301
Oklahoma	2,364	213	2,577	2,203	167	2,370	1,899	82	1,981	1,857	81	1,938
Oregon	1,705	41	1,746	1,606	36	1,642	1,699	24	1,723	1,579	11	1,590
Pennsylvania	3,717	21	3,738	4,095	16	4,111	4,524	15	4,539	4,640	9	4,649
Rhode Island	85	—	85	97	—	97	117	—	117	119	—	119
South Carolina	1,904	2	1,906	2,171	5	2,176	2,033	1	2,034	2,127	2	2,129
South Dakota	1,060	169	1,229	809	158	967	934	149	1,083	1,130	118	1,248
Tennessee	3,936	15	3,951	4,522	16	4,538	4,207	13	4,220	4,472	6	4,478
Texas	12,338	226	12,564	13,252	192	13,444	9,849	77	9,926	8,183	95	8,278
Utah	688	15	703	625	6	631	480	4	484	308	1	309
Vermont	509	5	514	600	2	602	625	—	625	639	—	639
Virginia	2,736	5	2,741	3,253	5	3,258	3,309	6	3,315	3,704	1	3,705
Washington	1,956	105	2,061	1,652	83	1,735	1,450	39	1,489	1,433	30	1,463
West Virginia	525	1	526	685	—	685	925	1	926	850	—	850
Wisconsin	2,821	82	2,903	2,615	60	2,675	2,225	41	2,266	1,900	23	1,923
Wyoming	302	26	328	168	18	186	149	7	156	131	8	139
U.S. Govt.	530	—	530	13	—	13	29	—	29	183	2	185
Miscellaneous	590	3	593	306	—	306	250	—	250	529	—	529
TOTAL	113,759	3,975	117,734	112,761	2,912	115,673	106,758	2,037	108,795	106,531	1,653	108,184

Source: Farm & Industrial Equipment Institute. Figures do not include garden tractors, motor tillers or contractors off-highway types.

NOTEBOOK (from pg. [illegible])

ance between the farmer and his friend, the trial lawyer — his only friend. OSHA can't do anything but grant exemptions. USDA makes no effort. CPSC has no jurisdiction and the National Safety Council has only one person. So the farmer's only friend is access to tort law. We have to take common sense to high places. Farm safety is a political issue, and we have to amass our strength to push a sensible farm safety policy."

And when he closed with, "We need to protect and extend tort laws," he got applause and cheers.

Some quotes from the question-answer session:

Libbra: "I keep hearing that 'the farmer doesn't want safety.' But the Illinois Farm Bureau doesn't represent me. It's a big insurance company. They own part of Archer Daniels Midland."

Floor comment: "This has been a low-level program for the problem."

Harry Philo, trial attorney, from the audience: "Ag engineers don't know a damned thing about safety engineering. They don't know and they don't care. The standards are pathetic on warnings. Deere's warnings in 1966 were better than ASAE's are now. Some ag engineers have

Retail Sales of Selected Farm Equipment — Jan.-Dec., 1986 and 1987[1]

(In Units)

STATE	COMBINES SELF-PROPELLED		CORN HEADS		HAY BALERS[2]		WINDROWERS SELF-PROPELLED — POWER UNITS		WINDROWERS SELF-PROPELLED — TOTAL HEADS		GRINDER-MIXERS		SHEAR-BAR FORAGE HARVESTERS[3]		MOWER CONDITIONERS ALL-TYPES	
	1986	1987	1986	1987	1986	1987	1986	1987	1986	1987	1986	1987	1986	1987	1986	1987
Alabama	14	10	7	7	78	89	2	—	2	—	28	28	6	9	108	80
Alaska	1	—	—	—	—	2	—	—	—	—	—	1	—	—	—	3
Arizona	13	4	1	5	22	23	30	32	35	33	2	—	4	5	4	2
Arkansas	184	244	8	3	110	68	2	—	2	—	10	5	—	4	222	140
California	60	41	21	3	85	65	153	128	166	142	1	2	52	34	54	29
Colorado	90	81	43	30	141	138	61	57	70	62	9	11	12	5	80	84
Connecticut	—	—	—	—	27	19	—	—	—	—	—	1	17	17	57	53
Delaware	7	8	13	7	6	16	—	—	—	—	—	2	3	3	11	16
Florida	5	3	2	4	62	42	—	1	—	1	3	3	6	6	54	25
Georgia	33	47	33	18	100	135	—	—	1	—	29	26	7	19	103	98
Hawaii	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—
Idaho	71	70	1	3	140	130	73	85	93	89	—	2	7	11	50	41
Illinois	1,120	940	986	767	105	117	3	4	3	6	176	209	46	61	302	364
Indiana	602	542	526	443	143	139	—	1	1	1	133	182	27	45	341	343
Iowa	854	881	819	784	127	102	30	28	29	30	295	553	67	72	429	518
Kansas	484	467	63	71	73	103	64	66	82	71	35	46	19	27	124	247
Kentucky	63	66	40	39	141	168	—	2	—	2	61	60	32	48	518	529
Louisiana	32	35	10	—	58	38	—	—	—	—	4	4	5	5	47	45
Maine	—	—	—	—	31	35	—	—	—	—	—	—	18	19	129	120
Maryland	53	30	49	25	66	73	6	7	6	7	6	13	34	34	100	108
Massachusetts	—	—	—	—	31	25	1	—	1	—	—	—	15	10	55	65
Michigan	144	129	123	124	197	125	13	9	18	8	77	83	112	100	363	353
Minnesota	462	457	295	280	308	233	56	50	65	57	137	175	153	174	595	510
Mississippi	86	78	—	3	38	44	—	—	—	—	9	11	6	7	52	43
Missouri	397	391	173	149	166	179	8	4	10	5	71	88	23	20	541	565
Montana	163	140	—	—	113	90	94	88	119	113	4	7	17	19	84	64
Nebraska	603	591	426	362	43	52	35	83	54	95	80	121	65	56	223	240
Nevada	—	—	—	—	22	17	20	14	26	19	—	—	3	7	13	13
New Hampshire	—	—	—	—	31	43	—	—	—	—	—	1	16	12	107	102
New Jersey	4	4	—	1	25	21	—	—	—	—	9	6	8	7	21	38
New Mexico	10	3	4	2	94	65	26	35	28	34	1	2	4	3	25	22
New York	29	32	36	33	287	267	1	17	17	17	25	23	221	256	675	725
North Carolina	98	93	107	83	157	177	—	—	—	1	19	21	34	32	302	287
North Dakota	433	444	20	25	16	6	95	72	130	86	30	55	44	35	124	141
Ohio	479	418	364	270	247	239	13	10	13	10	129	179	84	88	480	590
Oklahoma	71	61	13	—	110	128	21	34	22	35	11	16	4	3	229	196
Oregon	40	77	3	1	143	125	60	129	93	167	2	3	16	22	92	104
Pennsylvania	109	54	95	43	352	389	17	23	38	23	98	120	173	182	635	776
Rhode Island	—	—	—	—	2	—	—	—	—	—	—	—	—	—	2	—
South Carolina	26	36	15	17	41	66	—	—	—	—	7	14	4	8	86	79
South Dakota	278	270	130	101	34	26	96	77	106	108	79	92	63	74	181	130
Tennessee	53	45	22	13	160	182	—	—	—	—	35	59	32	19	431	402
Texas	206	152	61	42	396	280	23	20	26	21	53	55	21	16	611	490
Utah	7	7	1	—	113	129	51	30	54	36	4	8	23	21	97	84
Vermont	1	1	1	2	45	49	2	3	3	4	—	—	61	61	166	219
Virginia	30	24	23	14	126	146	2	3	2	3	23	25	66	48	427	515
Washington	59	67	8	3	158	106	50	62	74	76	4	1	17	23	82	81
West Virginia	1	1	1	1	59	81	—	—	—	—	9	11	14	12	87	124
Wisconsin	176	122	173	143	632	496	79	82	85	89	88	151	498	528	1,324	1,399
Wyoming	7	6	—	3	67	58	35	46	43	50	1	3	4	3	31	28
U.S. Govt.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Miscellaneous[4]	—	—	—	—	6	6	—	—	—	—	—	—	1	—	24	9
TOTAL	7,660	7,172	4,716	3,924	5,734	5,352	1,255	1,287	1,518	1,501	1,797	2,478	2,164	2,280	10,898	11,239

Source: Farm & Industrial Equipment Institute

[1] Includes revisions for prior months

[2] For making bales of under 200 lbs.

[3] Pull-type, mounted, self-propelled

[4] Sales reported as miscellaneous are retail sales which cannot be classified by state or as U.S. Government. They include sales and dispositions that do not go through usual marketing channels such as gifts to non-profit organizations, intra-plant or company transfers, etc.

been critical (of the standards), but they're not here.

"It's a national scandal. The taxpayers pay because the law gives a license to maim. The only people who can change it are the trial lawyers."

Hahn: "There's an opportunity for those of you trial lawyers who are qualified to work with us, perhaps on a joint (safety) committee. We need dialogue to bring all points of view together."

Libbra: "With all due respect, how many of you have driven a combine? Manufacturers never come back to me to see about performance and safety. Until government takes a lead on this, it's not going to get done. You have to have political

(MORE, next page)

Value of U.S. Farm Equipment Exports by Countries of Destination

(Value in Thousands of Dollars)

Country	1984	1985	1986	1987
Western Hemisphere				
Canada	$891,074	$791,762	$649,405	$646,049
Mexico	113,912	214,838	76,496	67,894
Guatemala	3,610	3,719	5,034	4,603
Honduras	5,890	3,884	3,486	4,761
El Salvador	3,661	2,397	2,471	2,366
Costa Rica	6,306	5,073	3,718	3,954
Panama	2,704	3,396	5,057	7,811
Trinidad	2,544	2,410	1,979	2,357
Dominican Republic	5,545	4,934	11,925	14,502
Colombia	16,191	11,989	12,349	17,973
Jamaica	4,398	3,210	2,537	5,797
Venezuela	23,904	43,193	54,116	57,265
Brazil	16,423	17,707	18,447	22,619
Argentina	10,136	5,283	4,695	15,417
Bolivia	3,636	3,382	3,127	2,115
Chile	5,581	7,385	5,638	8,462
Ecuador	6,858	11,056	11,044	6,051
Peru	7,052	4,079	6,131	5,812
Paraguay	1,536	1,653	3,156	2,874
Europe				
Denmark	2,467	1,983	2,933	5,797
Sweden	9,066	3,445	3,366	9,882
United Kingdom	68,267	53,285	53,344	63,063
Netherlands	7,586	6,850	12,463	12,052
Belgium	53,832	23,595	40,770	49,830
France	89,374	60,232	68,371	95,630
West Germany	67,436	56,817	51,695	55,058
Hungary	10,955	12,741	13,151	8,763
Switzerland	3,204	2,441	2,701	2,149
Spain	10,986	9,760	20,838	22,150
Italy	8,610	7,572	13,150	13,218
Greece	22,295	18,094	5,045	2,169
Middle East				
Israel	16,958	13,844	7,459	7,232
Saudi Arabia	257,307	96,269	73,559	115,555
Turkey	2,559	1,975	3,534	4,905
Jordan	3,664	2,525	942	2,938
Asia and Pacific				
Pakistan	1,107	687	2,036	2,719
Singapore	13,100	4,315	5,264	8,057
China (Taiwan)	2,296	2,635	2,727	3,304
China (P.R.C.)	16,894	6,545	11,950	9,634
Philippines	4,045	1,967	2,297	2,525
Korea	5,236	3,294	2,706	5,929
Japan	20,196	17,458	18,876	25,949
Australia	214,075	141,506	47,670	49,110
New Zealand	5,293	3,723	2,706	2,108
Africa				
Algeria	5,133	4,418	6,168	4,680
Morocco	256	4,148	526	4,156
Sudan	4,498	2,163	3,811	5,902
Nigeria	2,538	5,856	5,967	4,483
Egypt	11,436	22,510	15,876	4,680
Rep. South Africa	59,537	29,370	25,011	24,034
Total U.S. Exports, Farm & Industrial Equipment	**$2,235,014**	**$1,854,772**	**$1,466,690**	**$1,579,894**

Source: U.S. Dept. of Commerce, International Trade Admin., Office of Capital Goods and International Construction.

NOTEBOOK *(from pg. 11)*

leadership to go with the voluntary stuff. With a lawyer, at least you get access."

Skromme: "You folks have a lot of expertise; you've talked with a lot of farmers. You know what causes accidents. Let's form a committee and talk."

Habush: "I am willing to try to help ag engineers to design farm equipment — I have done it in a courtroom. But (a joint committee) is pure manure. It's ridiculous. They *know* how to design out hazards. But it's cheaper to pay an occasional claim than to retrofit."

Hightower: "I think it would be unproductive. Nothing will be done until the political process makes it happen. You (lawyers) have the ability to forge coalitions, to insert yourselves into the political process....I beat (the big farm organizations) in the political process. There are several true family farm organizations, and you can put a coalition together. Representatives and senators can be turned around on these matters."

Philo: "There are many farmers, manufacturers and dealers in trouble. We're dumping on manufacturers, on farmers, etc. But it's a societal problem."

One thing I'll say for ATLA: They end their sessions on time. I came away from it wondering if everything is going to continue pretty much the way it has for too long:

1. Farmers take risks, the prosperous ones as well as the economically distressed ones. It's part of their culture. Eventually, some take one risk too many.
2. Farmers' attorneys take equipment makers to court, often very successfully.
3. Manufacturers step up efforts to make machines safer, often successfully. They also work in the political process to alter the tort system, often not very successfully.

If enough of these trends continue indefinitely, there won't be any farmers left. If there are any equipment makers left, their fail-safe equipment will be so unaffordable that it won't make any difference how many farmers there are. Clearly, some things have to happen to change the trends.

Some questions:

Would a joint committee of engineers, farmers, lawyers and other in-

Farm Equipment Exports by Type of Product

Product	Jan.-Dec. 1985 Quantity	Jan.-Dec. 1985 Dollar Value in Thousands	Jan.-Dec. 1986 Quantity	Jan.-Dec. 1986 Dollar Value in Thousands	Jan.-Dec. 1987 Quantity	Jan.-Dec. 1987 Dollar Value in Thousands
Combines, pull-type	829	$13,423	1,208	25,192	1,734	$34,099
Combines, self-propelled	3,942	170,229	3,729	126,771	3,623	135,010
Cultivators, tractor-drawn or mounted	2,177	5,876	1,323	2,972	968	2,295
Cultivators, NEC, and Weeders	3,571	6,052	1,254	3,504	3,713	4,812
Farm Elevators and Blowers	1,766	5,770	1,877	3,847	1,498	3,795
Farm Wagons and Carts	833	2,021	1,877	3,847	1,197	2,041
Parts for Farm Wagons and Carts	—	897	—	701	—	952
Fertilizing Machines	4,580	13,820	6,375	13,831	4,461	9,772
Forage Harvesters	1,655	19,861	1,125	20,863	1,046	22,655
Harrows, Disk	1,681	7,768	866	3,111	920	3,524
Harrows, NEC, & Soil Pulverizers	4,266	4,764	3,014	3,505	4,688	5,030
Parts for Harrows, Stalk Cutters & Soil Pulverizers	—	9,292	—	3,745	—	3,816
Harvesting Machines, NEC	5,329	75,125	3,858	43,489	3,603	38,503
Harvesting Machine Parts	—	129,487	—	123,102	—	115,839
Hay Balers	4,387	32,563	4,311	31,340	5,429	41,400
Haying Machines, NEC (incl. rakes & tedders)	2,722	17,083	2,121	14,367	2,439	17,655
Parts for Haying Machines	—	14,845	—	12,766	—	15,703
Mowers, Cutterbar, tractor-drawn	1,400	2,895	1,475	3,138	985	3,042
Mowers, Rotary, tractor-drawn (excl. lawn mowers)	7,481	5,691	9,395	6,210	11,388	5,953
Mowers, NEC, tractor-drawn (excl. lawn mowers)	2,372	6,647	1,686	5,188	1,480	6,597
Planting Machines	3,340	7,816	1,799	7,342	2,134	7,216
Plows, Disk	853	2,357	672	1,418	669	1,651
Plows, Moldboard	1,654	5,351	480	1,765	1,380	4,358
Plows & Listers, NEC	3,272	9,055	2,486	6,627	4,247	7,609
Parts for Plows, Listers, Cultivators & Weeders	—	9,184	—	8,118	—	9,393
Seeding Machines	8,599	18,709	7,267	14,862	4,591	9,637
Parts for Planting, Seeding & Fertilizing Machines	—	13,479	—	11,888	—	9,763
Sprayers, Agricultural, including par[illegible]	596,475	172,763	446,459	136,554	598,055	179,147
Farm Tractors:						
Under 40 PTO HP	669	3,521	841	4,403	881	4,862
40-59 PTO HP	798	8,536	570	5,682	395	4,688
60-79 PTO HP	818	12,279	453	6,815	247	3,531
80-99 PTO HP	1,164	23,580	490	9,913	375	9,075
100-119 PTO HP	760	22,200	536	18,136	429	13,629
120-139 PTO HP	1,741	60,801	849	29,213	825	29,019
140-159 PTO HP	1,264	47,619	751	27,120	655	24,101
160-179 PTO HP	1,409	63,625	1,072	45,451	1,029	43,592
180 PTO HP & Over	1,793	119,052	1,175	75,166	912	59,430
Other Farm Tractors	1,157	23,815	1,525	21,961	2,544	26,711
Parts for Farm Tractors	—	566,941	—	454,098	—	517,150

Source: U.S. Dept. of Commerce, International Trade Admin., Office of Capital Goods and International Construction
NEC — Not elsewhere counted or classified.

terested parties be able to get anything substantive accomplished? Is there anyone around who's charismatic enough to pull the necessary parties together to form such a group?

Will these lawyers use the political process to force safety practices on the farm or to mandate design features that are now voluntary? Maybe some individuals will, but most will stick to using the court system the way they do now, but perhaps with more intensity than we've seen so far.

Will farm equipment manufacturers reach a point at which they do what they've never liked to do? Will they turn to government to force farmers into processes and adoptions that will cut down on accidents?

I'll agree with Harry Philo on one point. It's a societal problem. And society *can* change itself and its attitudes, as is happening right now with regard to liquor and traffic accidents and their consequences.

Eventually, farmers will have to understand that safe equipment and practices, though sometimes costly, are part of the unavoidable price to be paid if one chooses to farm. And they'll have to perceive the tangible, positive benefits of safety to the point that they will never risk the welfare of their families on anything less.

To get farmers to this point, I think, will involve the best efforts of all segments of agricultural industries, educators, *all* farm groups and, yes, the government. If the lawyers don't want to get involved, so be it. ☐

Dollar Value of Farm Equipment Imports by Country of Origin, Jan. 1982-Dec. 1987

(In Thousands)

Country	Jan.-Dec. 1982	Jan.-Dec. 1983	Jan.-Dec. 1984	Jan.-Dec. 1985	Jan.-Dec. 1986	**Jan.-Dec. 1987**
Canada	$487,286	$453,551	$576,583	$415,527	$366,074	**$497,337**
Mexico	11,349	18,563	10,099	8,159	6,218	**11,419**
Brazil	4,780	6,424	11,395	12,214	10,967	**18,877**
Sweden	3,023	2,873	4,002	3,464	4,538	**4,731**
Denmark	4,910	5,856	7,670	9,331	7,290	**9,676**
Netherlands	13,924	32,831	46,912	33,945	29,778	**31,513**
United Kingdom	93,806	163,678	217,201	207,020	234,406	**256,182**
Belgium	25,730	23,691	27,697	29,389	42,537	**46,125**
France	30,804	41,333	72,605	68,681	64,556	**64,776**
West Germany	169,087	248,015	223,651	222,756	252,740	**244,560**
Hungary	7,564	2,404	11,665	5,444	1,816	**5,917**
Czechoslovakia	1,113	1,892	5,888	5,926	6,197	**3,759**
Romania	15,461	6,088	4,701	4,409	1,921	**5,326**
Italy	95,092	99,219	152,409	122,300	118,808	**128,651**
Spain	6,541	2,946	7,124	3,996	5,978	**6,254**
Israel	2,677	2,988	4,183	7,619	7,475	**8,629**
New Zealand	9,792	11,885	11,220	10,725	8,123	**11,012**
Australia	4,662	3,209	4,568	5,421	5,941	**7,159**
Japan	181,056	204,818	309,757	355,577	418,780	**420,852**
China (Taiwan)	2,913	3,617	5,175	5,132	6,066	**7,297**
China (P.R.C.)	1,381	1,949	3,113	2,568	3,002	**5,408**
Korea	NA	852	742	1,256	5,667	**7,456**
U.S.S.R.	NA	1,255	852	1,266	3,731	**5,394**
TOTAL	$1,179,734	$1,347,483	$1,729,402	$1,557,623	$1,630,628	**$1,834,925**

Source: U.S. Dept. of Commerce, International Trade Administration, Office of Capital Goods and International Construction.

Imports of Farm Equipment by Product

	Jan.-Dec., 1985		Jan.-Dec., 1986		Jan.-Dec., 1987	
Product	Quantity	Value in Thousands of Dollars	Quantity	Value in Thousands of Dollars	Quantity	**Value in Thousands of Dollars**
Knives & Cutting Blades	11,710,518	$ 10,240	8,741,126	$ 8,202	9,628,822	**$ 10,497**
Plows & Listers	2,555	2,700	3,363	7,962	5,532	**11,246**
Cultivators & Weeders	19,075	14,198	32,017	25,127	52,430	**30,088**
Parts of Plows, Cultivators, Weeders & Listers	—	29,840	—	23,536	—	**30,362**
Harrows, Rollers, Stalk Cutters, Soil Pulverizers	32,375	10,844	32,442	16,987	23,565	**24,614**
Parts of Harrows, Rollers, Stalk Cutters, etc.	—	13,531	—	12,157	—	**24,224**
Planting, Seeding & Fertilizing Machinery	39,976	23,633	30,288	24,074	34,137	**31,550**
Parts of Planting, Seeding & Fertilizing Machinery	—	9,101	—	9,858	—	**11,107**
Haying Machinery other than Mowers	7,661	10,426	5,347	10,588	7,650	**8,002**
Mowers except Lawn Mowers	17,140	29,906	19,060	30,191	21,865	**33,601**
Harvesting Machines, NES	10,312	75,217	6,858	47,808	8,248	**58,184**
Parts of Harvesting Machines	—	56,216	—	57,807	—	**61,911**
Farm Wagons & Carts	4,571	4,368	3,455	3,345	3,595	**4,006**
Agricultural Machines & Implements, NES	—	131,945	—	143,876	—	**161,517**
Parts of Agricultural Machines, NES	—	78,377	—	82,488	—	**129,033**
Tractors, Agricultural, Wheel-Type, New, excluding Industrial*	126,959	718,163	127,964	807,047	130,734	**866,824**
Tractors, Agri., Used	6,605	41,883	4,110	28,367	3,834	**23,641**
Parts for Agri. Tractors	—	285,290	—	278,482	—	**299,551**
Walk-Behind Rotary Tillers	3,889	1,765	16,035	2,470	11,545	**3,302**

Source: U.S. Dept. of Commerce, International Trade Administration, Office of Capital Goods and International Construction.

NES - Not elsewhere specified.

***Use of the term "industrial" here is understood to refer to such machines as forklifts but not to industrial tractors as commonly defined in the farm and industrial equipment industry.**

New Agricultural Tractor Imports, Jan. 1984-Dec. 1987

(In Units)

	Country of Origin	Under 40 HP*	40-79 HP*	80-99 HP*	100HP and Over*	HP Not Specifically Provided*	Not Elsewhere Specified, Excluding Industrial, Including Garden Types**	Totals
1987	Belgium	—	76	398	422	—	2	898
	Brazil	40	104	28	—	2	71	245
	Canada	91	12	146	1,373	29	721	2,372
	Czechoslovakia	—	2	—	1	740	—	743
	France	26	62	222	1	6	14	331
	Italy	139	217	41	1	17	3,548	3,963
	Japan	52,070	6,722	173	53	357	24,902	83,277
	Korea	686	—	—	—	—	—	686
	Mexico	—	341	2	1	1	—	345
	Romania	477	954	—	—	—	1	1,432
	U.S.S.R.	758	569	120	—	—	1	1,448
	United Kingdom	3,938	15,417	1,655	174	193	257	21,634
	West Germany	1,535	6,017	717	44	24	871	9,208
	Yugoslavia	206	803	—	—	—	359	1,368
	Totals	61,064	31,383	3,521	2,101	1,666	30,999	130,734
1986	Belgium	26	67	29	543	—	2	667
	Canada	134	41	57	728	35	542	1,537
	Czechoslovakia	—	306	—	—	541	44	891
	France	27	85	60	191	2	19	384
	Italy	102	1,189	113	41	5	3,849	5,299
	Japan	52,000	15,282	134	1,850	679	12,648	82,593
	Korea	527	8	—	—	—	—	535
	Romania	29	321	—	—	145	—	495
	U.S.S.R.	626	463	114	10	—	1	1,214
	United Kingdom	4,846	16,396	1,387	21	216	214	23,080
	West Germany	266	8,417	1,220	80	30	225	10,238
	Yugoslavia	6	195	—	—	—	3	204
	Totals	58,746	43,121	3,182	3,475	1,663	17,777	127,964
1985	Canada	118	66	94	637	786	589	2,290
	France	138	360	193	255	4	42	992
	Italy	267	1,501	143	205	20	1,105	3,241
	Japan	58,807	13,306	75	76	233	16,331	88,828
	United Kingdom	5,362	11,028	1,220	565	101	137	18,413
	West Germany	999	6,639	1,513	473	119	140	9,883
	Totals	66,600	34,392	3,318	2,301	1,830	18,518	126,959
1984	Canada	56	74	145	899	1,539	985	3,698
	France	2	213	223	755	5	74	1,272
	Italy	141	1,836	432	329	1	496	3,235
	Japan	50,723	9,347	192	122	298	18,591	79,273
	United Kingdom	4,955	16,166	2,304	1,498	72	330	25,325
	West Germany	124	5,333	2,113	537	18	46	8,171
	Totals	56,782	35,428	5,626	4,195	2,207	20,642	124,880

Others in 1985: Czechoslovakia - 591; U.S.S.R. - 406; Netherlands - 389; Belgium - 157.

Source: U.S. Dept. of Commerce, International Trade Admin., Office of Capital Goods and International Construction.

*Excluding garden tractors. **Including garden tractors and rototillers.

FOR YOUR INFORMATION

Diamond Chain Co. Literature on its Sapphire roller chain, including dimensions. It's a "light-duty, low-cost chain made to ANSI standards."

Write In (4) on Reply Card

Falk Corp. "Speed Reducers and Your Bottom Line—a Closer Look" has information on how to evaluate overall lifetime costs of speed reducers, talks about maintenance costs and parts replacement costs.

Write In (5) on Reply Card

Hypro Corp. A 25-page guide on the company's line of pumps and accessories for the farm, pressure wash and industrial markets. There are 75 pump models described, including ceramic plunger and polypropylene centrifugal pumps.

Write In (6) on Reply Card

Trail-Eze Trailers. Two brochures with specification and option information on the D16R-D25R and D66-D1200R trailer models.

Write In (7) on Reply Card

BOOK LOOKS

Protection for Engineers

"Protecting Engineering Ideas & Inventions" is a 223-page legal guide for engineers, scientists and managers. Written by Ramon Foltz, a patent attorney, and Thomas Penn, an engineering manager, it deals with legal issues such as patents, copyrights, trademarks, trade secrets, and secrecy agreements, consultants and outsiders' ideas. It's $39.00 plus $3.00 postage from Penn Institute, Inc., Box 41016, Cleveland, Ohio 44141 (telephone 800-426-7495).

All About Farm Tires

The third addition of Armstrong Tire Co.'s "Farm Tire Handbook" contains articles by *Successful Farming* magazine writers on selecting proper tires, extending tire life, proper ballasting, compaction and radial tires. There are charts of tires sizes and specifications. It's available from Armstrong dealers or Armstrong Tire Co. 500 Sargent Dr., New Haven, Conn. 06536.

2-Cylinder Deere Days

"How Johnny Popper Replaced the Horse" covers the 40-year history of John Deere two-cylinder tractors. It's available for $24.95 plus $3.00 (and $1.56 sales tax for Illinois residents) from John Deere at 1400 3rd Ave., Moline, Ill. 61265.

Kids' Tractor Storybook

"Johnny Tractor and His Pals" is being published by John Deere 30 years after its original appearance. It's a storybook for kids. Priced at $2.95, it is available from John Deere dealers.

INDUSTRY UPDATE

August U.S. Retail Sales: Drought Takes Its Toll

Sales of tractors and self-propelled combines were lower in August than a year earlier, primarily because of drought. However, sales of big two-wheelers in August, 1987, were unusually strong because Case IH was running an aggressive marketing effort at that time to clear out existing inventory to make room for the Magnum series. Four-wheeler sales in August continued strong, as were sales of 40-99 hp tractors and hay tools.

UNIT RETAIL SALES

Equipment	August 1988	August 1987	August % Change	January-August 1988	January-August 1987	January-August % Change
Farm Wheel Tractors:						
2-Wheel Drive						
Under 40 HP	3,565	4,367	(18.4)	39,713	43,793	(9.3)
40 & Under 100 HP	2,332	2,182	6.9	22,623	20,006	13.1
100 & Under 140 HP	229	901	(74.6)	2,756	2,836	(2.8)
140 HP & Over	758	2,049	(63.0)	6,894	5,744	20.0
Total 2-Wheel Drive	6,884	9,499	(27.5)	71,986	72,379	(.5)
4-Wheel Drive						
Under 200 HP	48	22	118.2	603	303	99.0
200 HP & Over	101	66	53.0	1,055	554	90.4
Total 4-Wheel Drive	149	88	69.3	1,658	857	93.5
Total Farm Wheel Tractors	7,033	9,587	(26.6)	73,644	73,236	.6
Combines (Self-Propelled)	378	740	(48.9)	3,037	2,474	22.8
Balers (Bales under 200 lbs)	607	599	1.3	4,578	4,314	6.1
Forage Harvesters (Shear Bar Type)	238	230	3.5	1,382	1,317	4.9
Mower Conditioners	1,021	948	7.7	8,608	8,917	(3.5)

OPEDA Reports on Retail Markets

The Outdoor Power Equipment Distributors Assn. has reported on its research about retail outlets for outdoor power equipment.

Walk-behind lawn mowers: Farm-oriented retail outlets get 2 percent of the total. Biggest share, 28 percent, goes to national retail outlets (i.e., Sears); 17 percent to hardware stores; 15 percent to discount stores, 12 percent to lawn and garden centers, 7 percent each to department stores and home centers, and 3 percent to outdoor power equipment dealers.

With larger equipment, the market shares change.

Riding mowers: Farm-oriented outlets, 4 percent; lawn and garden centers, 26 percent; national retailers, 15 percent; outdoor power dealers and hardware stores, 11 percent each; equipment rental dealers, 8 percent; discount stores, 6 percent; and home centers, 4 percent.

Lawn and garden tractors: Farm-oriented outlets, 7 percent; national retailers, 28 percent; lawn and garden centers, 15 percent; outdoor power dealers, 13 percent; discount and hardware stores, 8 percent each; home centers, 7 percent; and equipment rental dealers, 3 percent.

Deere's 9 Months: Net of $235 Million

Deere & Co. has reported net earnings for the first nine months of fiscal 1988 (ended July 31) of $235 million, compared with a loss of $132 million in 1987. Sales for the three quarters reached $3.883 billion, compared with $2.817 billion in 1987. Deere had an extended labor dispute in the first half of 1987.

In the third period, earnings were $81 million, compared with $25 million in the same 1987 quarter. Quarterly sales were $1.388 billion in 1988 and $1.132 billion a year earlier.

Canadian Sales Weakened in August

Retail sales of farm equipment in Canada through the first eight months were off slightly from 1987 levels after drought took its toll in August. Tractor unit volume was down by a third for the month to 1,043 units from 1,556, but the year-to-date total was off only 3 percent at 10,587 units.

Major tractor sales declines in the eight months were in under-40-hp models (off 12 percent at 2,846 units) and two-wheel-drive-over-100-hp models (off 17 percent at 1,361 units). Four-wheel-drive tractors showed a 36 percent rise in unit sales to 667 over the year.

Mower conditioner sales were up 16 percent for August and 18 percent for the year at 2,288 units. Balers (smaller type) were off 11 percent for the year at 1,095, but big balers were up 9.5 percent at 2,564 units. Forage harvesters were up 30 percent at 380. Self-propelled combines were off by a third in August at 163 units, down 6 percent for the year at 539; pull-type combines were down 38 percent for the year at 116. Through the eight months, swather unit sales rose 30 percent to 701 while sales of pull-types were off 17 percent at 778.

Source: Canadian Farm & Industrial Equipment Institute, Burlington, Ont., telephone 416/632-8483.

Record Sales Year for Toro

Toro Co., Minneapolis, Minn., had sales in the fiscal year ended July 31 of $609 million, up 17 percent on 1987's previous record of $521 million.

Earnings rose 18 percent from $17 million to $20 million.

K.B. Melrose, CEO, said that the acquisition of Wheel Horse Products, Inc., offset lost walk power mower sales.